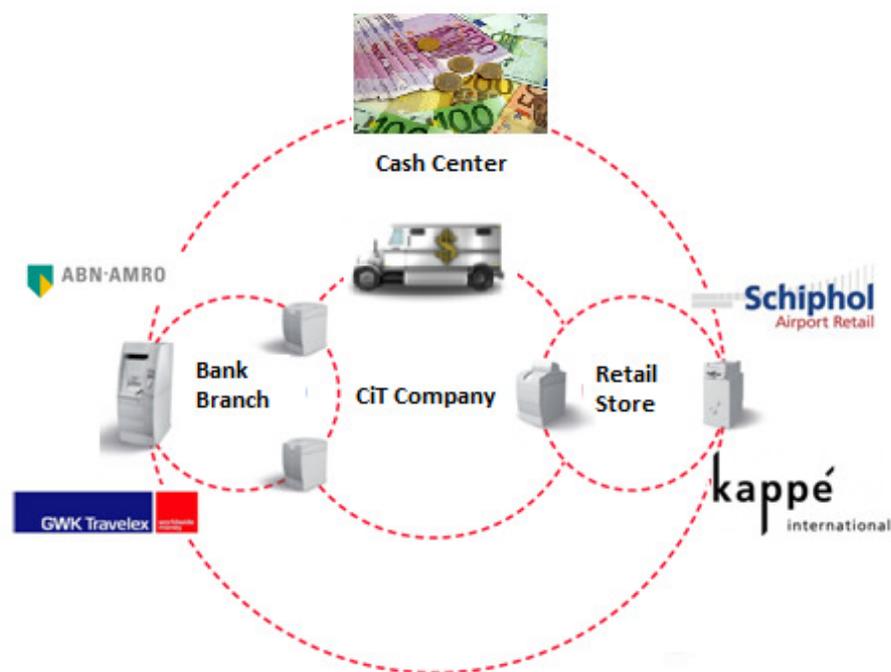


Enhancing the efficiency of retail cash handling processes at Amsterdam Airport Schiphol



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Master Thesis (Public version)

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Abstract

During the recent years, electronic payment methods have become more customary and in cases more preferable. Nevertheless, cash remains a popular form of payment due, inter alia, to its ubiquity. Large use of cash is associated with security issues, investment costs, logistics costs of transport and handling cash, personnel costs, and the like. To deal with these issues, many retailers have, to different extents, outsourced cash handling services to CIT¹ companies. Kappe' and Schiphol Airport Retail (SAR) are two retail groups functioning at a number of locations in Amsterdam Airport Schiphol. They currently outsource part of their cash handling services to ABN-AMRO and GWK-Travellex. This results in a further increase in costs incurred by Kappe' and SAR. Consequently, enhancing the efficiency of money flow is of significant importance to both corporations.

The aim of this research is to develop cash handling processes which can bring about a more efficiency. This is done firstly by conducting a literature review on the reasons behind large costs of cash handling for retailers. Then the current processes of cash handling at Kappe' and SAR are studied to explore their deficiencies. After that, alternatives (e.g. automation, joint cash office, clustering) which can bring about a more efficient cash handling process are proposed and assessed on criteria of interest to the problem owners (Kappe' and SAR). The implementation chapter is done for the selected alternative. In the next stage, the prudence of the selected processes is re-evaluated by using a multi-criteria analysis methodology and also based on the trends in customers' use of cash in payments. Finally, given the findings of the research, recommendations are provided for possibilities of further improvement in cash handling processes.

Key words: Retailers' costs of payment, Efficient cash handling processes, Activity-Based Costing, Cash-in-Transit Company, Cash recycling, and Multi-Criteria Decision Making

¹ Cash in Transit

Preface

The report at hand is the result of my graduation research project at Schiphol Airport Retail (SAR) and Kappe' during the period between February 2013 and July 2013. With this graduation thesis, I conclude my study in MSc. Management of Technology at Delft University of Technology, the Netherlands. For the completion of this research, I am indebted to the priceless guidance of my first supervisor Drs. Ron van Duin. I am as well grateful to Prof. Lorant Tavasszy and Dr. Sebastiaan Meijer for their valuable feedback. I would also like to express my sincere gratitude to Ms. Cindy Groothuizen, Mr. Casper Vos, Mr. Peter-Jan Rozenberg, and Mr. Jacques Parson from SAR and Kappe' for their support and constructive comments.

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Glossary

Automated cash handling:

The process of dispensing, counting and tracking cash in a bank, retail, or other business environment through specially designed hardware and software for the purposes of loss prevention, theft deterrence and reducing management time for oversight of cash drawer (till) operations.⁵⁵

Back-office functions:

Processing of cash from cash payment transactions (counting, sorting, preparation of change floats, cash registers for cash, etc.)¹²

Back office costs of cash handling:

Costs at centralized levels to be allocated to the retail payment system, such as the costs of control and management departments related to for instance, logistics issues, the costs of information supply to customers in the form of account statements and telecommunications costs.¹⁰

Balancing a cash register:

The process of counting the money, reconciling the receipts and balancing the cash drawer creates an internal control or accountability of the day's transactions.⁵⁶

Cash Collection Point Cashiers:

Conduct cash transactions with customers. Monies can be received in person and/or the mail. Endorse all checks immediately upon receipt with a restrictive endorsement. Provide a receipt to every person paying in person. Enter each transaction into a cash register or cash receipt journal/log. Count the cash and forward it on to the deposit preparer (or cash collection point supervisor if one is designated) at the end of the shift. Forward any supporting documentation (cash register tapes, etc.) to the reconciler (or cash collection point supervisor if one is designated).⁵⁷

Cash Collection Point Supervisor:

Monitor cash receipting functions and authorize various transactions, such as refunds, voids, and cash drawer reconciliation. Have access to the cash drawers and safe, if applicable.⁵⁷

Cash drawer:

A compartment underneath a cash register in which the cash from transactions is kept. The drawer typically contains a removable till.⁵⁸

Cash Handling in Retail:

Learn cash handling procedures and security for any retail environment. Find out where to purchase cash registers and other cash handling equipment. Print forms for balancing cash drawers and estimate how much money to keep in the till.⁵⁶

Cash Management:

practices and techniques designed to accelerate and control collections, ensure prompt deposit of

receipts, improve control over disbursement methods, and eliminate idle cash balances.⁵⁶

Cash office:

A place where the cash collected at PoS is transferred to and counted. This place can also supply till floats.

Cash register (till):

A machine which shows and adds the prices of items bought, with a drawer for keeping the cash received.

cash shrinkage:

The difference between the amount collected at the PoS and the amount transferred to and counted at a cash office.

CiT (Cash-in-Transit)company:

Company which delivers cash handling services. Examples are G4S, Brinks, and GWKTravellex.

Coin dispenser:

A hardware used in automated cash handling for dispensing coin as change.⁵⁹

Collection:

The transfer of monies from one source to another for the payment of goods and/or services.⁵⁶

CVIT:

Cash/Valuables I Transit, the physical transfer of banknotes, coins and items of value from one location to another.⁶⁰

CVIT Van / armoured car:

An armoured van or truck, used in transporting valuables, such as large quantities of money (especially for banks or retail companies).⁶¹

Deposit Preparer:

Count the cash receipts, prepare the deposit and deliver it to the bank or designated deposit drop location. Submit all appropriate accounting information through the online E-deposit system. Deliver each bank validated deposit slip/E-deposit form to the Reconciler. Store the cash in a safe or other secure place until it is deposited.⁵⁷

Financial Institution:

Any bank, savings and loan association, or credit union accepting funds⁵⁶

Float:

The period of time that elapses between two collection or disbursement activities. Specific types of

float are: Billing Float, Mail Float, Processing Float (Collections), Processing Float (Disbursements)⁵⁶

Front-office costs of cash handling:

Costs of activities involving more direct contact with customers (compared to back office functions), I particular costs related to branch office networks, such as bank office counter services in connection with retail payment products and cash deposit facilities.¹⁰

Point of Sale (PoS):

The physical location at which goods are sold to customers. The point of sale is often more specific than the general building or store where something is sold, typically indicating the piece of technology which is used to finalize the transaction.⁶²

Private costs of payment:

All the costs incurred by relevant individual parties in the payment chain.

Reconcile:

Verify that the Deposit Preparer has deposited all cash received. On a monthly basis, reconcile validated deposit forms to the supporting documentation and to the General Ledger Statement of Accounts.⁸

Retailer:

An organisation in the business of offering products and/or services to private citizens and organisations.⁵⁶

Seigniorage:

The profit that Central Banks accrue through the circulation of cash coming from two sources. First from the face value of a banknote or coin less the printing or minting cost. Second from the interest gained on the value of the banknote or coin put into circulation for the duration of its life cycle.⁵⁶

Social costs of payment:

The costs to society, which reflect the use of resources in the production of payment services.⁷

Teller assist units (TAU), automatic teller safes (ATS) or teller cash dispensers(TCD):

Devices used in retail banking for the disbursement of money at a Bank teller wicket or a centralized area. Other areas of application of TAU include the automation of starting and reconciling teller or cashier drawers (tills) in retail, check cashing, payday loan / advance, grocery, and casino operations.⁵⁷

Till float:

cash put into the cash box at the beginning of the day to allow business to start.

Unfit notes:

Bank notes which are not suitable for recirculation. Unfit notes are usually returned to the Central Bank

for final authentication and destruction ⁵⁶

Vault Management System:

Inventory software that monitors the contents of a vault or series of vaults. Capable of being linked to network compatible hardware ⁵⁶

Chapter 1:

Introduction

By the end of 2009, the volume of cash in transaction in Europe had risen to more than €796 billion. This is a testimony to popularity of cash as a method of payment. Several factors influence such trends among which are ubiquity of cash, availability of other payment options, size of merchant, volume of transaction and industry sector. More acceptance of cash at retail stores leads, among others, to potential increase in security issues, investment costs, logistics costs of transport and handling cash, and personnel costs. A survey by Wincor Nixdorf has shown that in Europe more than €50 billion is spent on cash handling each year.¹

The flow of money at retail shops is often a timely and costly process. Reconciling at the Point of Sale (POS), counting, preparing cash for pick-up, forecasting demand and maintaining till floats are some of the tasks carried out in the cash handling process. Apart from high workload, large costs, and security issues, transparency of the cash cycle is also an area of concern.¹

One investigation of the cash centre environment revealed that it consists of a unique combination of pure service and pure manufacturing.² Some retailers seek assistance from Cash in Transit (CiT) companies for cash handling activities. Despite its advantages, this can result in a further boost in costs. The role of technology, automation, and in-house cash offices is neglected in many cases. All these problems give incentive for a study on possible scenarios for optimization of flow of cash at retail stores.

Kappe' and SAR¹ are two retail groups offering various products in their shops at a number of locations in Amsterdam Airport Schiphol. Kappe's products include cosmetics, sunglasses, medical products and perfumes which are available at its 12 stores situated in departure lounges 1, 2, 3 and 4. SAR's products are on the other hand, tobacco, liquor and confectionary available in its 7 different stores in lounges 1, 2 and 3. Kappe' and SAR maintain different levels of till floats in their stores. More importantly, they have distinct procedures for collection of cash as well as for provision of the needed amounts for daily transactions at their stores. However, both retail groups use external parties to handle (at least parts of) cash handling activities.

The diverse tasks and services that need to be done in a cash handling process impose large costs on retailers, and Kappe' and SAR are no exception in this regard. In this chapter, by explaining the general scheme of current procedures at Kappe' and SAR, different aspects of the problem are formulated. Given the extent of the problem, Kappe' and SAR consider it of key importance to investigate **"Alternative solutions for improving the efficiency of cash handling processes for retail stores at Amsterdam Airport Schiphol"**. Based on this objective, scope of the research is specified and research questions are posed. Finally, a step-wise approach is proposed in order to answer the research questions. Suitable data collection and analysis methodologies are recommended for each step.

¹ Schiphol Airport Retail

1.1. Research problem

In order to describe the research problem, it is crucial to have a clear understanding of the current processes of handling cash at Kappe' and SAR. A brief description of these processes is provided below.

1.1.1. Current procedure of cash handling

According to their agreement with Schiphol a number of currencies are accepted at the cash registers of Kappe and SAR (including Swedish and Norwegian Krone, Swiss Francs, Japanese Yen, Australian Dollars). Change is nevertheless only offered in Pounds, Euros and Dollars.

SAR has outsourced its cash handling activities between the stores and the bank to GWK^I Travelex. For the employees in SAR's store, a shift starts with issuing the initial till float from red seal bag of the previous shift. Each employee has an individual red seal bag with a personnel code. After the customer transactions take place during the shift, the shift ends with the employees emptying the tills in the counting room. A portion of the money (amounting to between 400€ and 500€) is counted and put in the personalized red seal bags. These red seal bags are then altogether put in a safe. The rest of the money in the till is also counted and put in blue seal bags to be collected by GWK's CVIT vans^{II}. However, the coins are only put in the red seal bags so that they can be recycled for the next shifts. The amount of money in the red seal bags and blue seal bags are compared with the actual transactions reported by GWK after counting.

In addition, if during the shift an employee needs additional coins or notes, the shift supervisor brings the needed amount from safety stock. In the past at least one supervisor was present during each of the three working shifts. Nowadays, three supervisory positions are defined for each store, but there are shifts during which none of the supervisors is present at the store. This may also be true at times of cash collection. The amount of coins needed for the next day are determined at the end of each day and faxed to GWK. Estimations of amounts needed in different currencies and denominations are based mainly on intuition, speculation and experience.

Kappe' has 12 stores in Amsterdam Airport Schiphol. The 7 stores located in Lounges 1 and 2 are run using an old system. New note dispenser/ depositor and coin dispensers are installed in store "P&C West". These machines are used as parts of the new procedure of cash handling which is used in the 5 stores located in Lounges 3 and 4. In Kappe's system, change is only offered in Euros and Dollars (and Pounds when available).

In lounges 1 and 2 coins needed for till floats are reordered every 3 weeks and stored in a central location at Schiphol to be provided to Kappe's employee. At the beginning of a shift, each of the employee counts the starting money to reconcile with the amount recorded by the previous shift's personnel. During the shift if smaller denominations are needed, one of the employees personally visits the bank. At the end of each shift, cash is counted and a starting amount is maintained in seal bags for the next shift. The rest of the money is deposited by every cashier individually at the close-by ABN office at Schiphol. This results in about 52 visits per day to the bank (once by each employee working in lounge 1 or 2). In addition there is on average 2 visits per day for supplying change in the needed currencies and denominations.

At the stores in lounges 3 and 4 which are run in the new system, starting amounts are withdrawn from the note dispensers at P&C West at the beginning of the shifts. At the end of their shifts, cashiers deposit the turnover money in the same machines. The money collected in the note

^I Grenswisselkantoor

^{II} waardetransporter

dispenser/depositor (apart from a safety stock amount) is deposited every 3-4 days. In case of shortage of change in the machine, ad hoc orders are placed which will be delivered with a lead time of 2 days.

1.1.2. Problem formulation

There are several reasons behind the large costs incurred by Kappe¹ and SAR for handling cash. The following problems have been identified in the current procedures:

- ❖ There are deficiencies and inefficiencies in current cash handling procedures. These include organizational aspects (e.g. number of working hours of personnel and personal end-of-shift deposits), investments in technological solutions for automation of procedures and degree of outsourcing cash handling activities.
- ❖ Attention for current and future share of cash in total payments and its implications for suitable changes to enhance the efficiency of the process is missing.
- ❖ Despite similarities in needs and type and size of their businesses, there seems to be a lack of cooperation in cash handling activities between Kappe¹ and SAR (and possibly other retailers at Amsterdam Airport Schiphol)

These problems can be broken down to the following:

➤ **Organizational inefficiencies of work flows**

SAR:

- Employees are required to spend time counting the money at the end of their shifts. This increases personnel costs paid for cash handling tasks rather than core activities.
- There is a risk of cash shrinkage since supervisors might be absent during working shifts and at the time of cash collection by GWK.

Current system of Kappe¹ in lounges 1 and 2 (Kappe's old system¹):

- Employees need to spend time counting the money at the beginning and end of their shift.
- Employees need to personally deposit money at the bank at the end of their shift. (about 60 visits per day per store)
- Employees need to visit the bank during their shift to exchange money or get other denominations (i.e. about 2 visits per day per store each of which take 30-60 minutes).
- Employees need to have the store managers check their transactions before and after visiting the bank to provide change.
- Due to personal responsibility of Kappe's employee for depositing cash, possibility of robbery is a concern.

Current system of Kappe¹ in lounges 3 and 4 (Kappe's new system¹¹):

- Employees of stores in Lounges 3 and 4 need extra time to travel to P&C West to withdraw and deposit money at the beginning and end of their shifts.

Apart from security issues and cost inefficiency, lack of a pre-defined structure for dealing with uncertainties in cash demand leads to employees' ineffectiveness in performing their primary tasks.

¹ Current system of Kappe¹ in lounges 1 and 2 hereon will be referred to as Kappe's old system.

¹¹ Current system of Kappe¹ in lounges 3 and 4 hereon will be referred to as Kappe's new system.

One example is the cases when a cashier is forced to leave the store to supply the needed cash, while customers wait or forego their purchases.

➤ **Technological inefficiencies: absence or limited use of state-of-the-art technology**

SAR:

- Counting money at the end of the shift is done manually by each cashier. The information is then entered in the computer to check the balance. This is a timely process. It also means more personnel cost.
- Safety stock is kept in a basin. Coin and note dispensers are not used.

Kappe's old system:

- In the old system, counting money at the beginning (double checking for previous cashier) and at the end of shift (by the cashiers themselves) is done manually. No machine is available.
- No note dispensers are available. So, if denominations or currencies are needed, employees need to visit the bank counter. This means a lot of waiting time, therefore more personnel costs and more waiting time for customers or even lost sales in some cases.

➤ **detachment of cash handling infrastructure and processes at Kappe' and SAR:**

- Despite their similar needs and contracts with Schiphol (e.g. currencies accepted in cash payments and those used as change), Kappe' and SAR have outsourced cash handling to ABN-AMRO and GWK, respectively. They are currently failing to benefit from economies of scale through a joint cash office.
- Degree of automation, level of employee involvement, and interval between cash-reorders are dissimilar. Integration of procedures might aid the organizations in sharing costs as well as spreading risks.
- Although Kappe' uses an office for storing the cash demand of three weeks, a common cash storage and forecast office at both organizations is missing. Such an office might enhance the efficiency of cash handling process by offering shared cash balances forecasted accurately.

In addition to the aforementioned problems, there are large amounts of un-invested cash and cash-in-between at Kappe' and SAR. They can be disregarded in calculations since the reported interest losses are not significant. However, alternative processes should be developed in such a way that amounts of cash-in-between can be reduced.

1.2. Research objectives

The objective of the research is to develop "**Alternative solutions for improving the efficiency of cash handling processes for retail stores at Amsterdam Airport Schiphol**". To achieve, this objective a number of smaller objectives need to be accomplished. Firstly, the current logistical scheme of money flow for Kappe and SAR at Schiphol airport needs to be described. Then, based on sources of costs and success criteria for the problem owners, alternative solutions for enhancing the efficiency of the cash handling process need to be developed. It is also intended to study the possibility of further cost savings through a collaborative cash handling process between Kappe' and SAR and even other retailers. The suggested alternatives will then be reassessed using a multi-criteria decision making technique as well as with attention for the trends in cash payments.

1.3. Research scope

In order to accomplish the research objectives, a number of aspects will be considered and their contribution to improvement of the money flow will be evaluated. These aspects include:

- ❖ Alternate procedures for enhancing the efficiency of cash handling procedures in terms of total costs, availability of employees for core tasks and other process criteria
- ❖ Risks and security issues of current processes of cash handling at Kappe' and SAR as well as the suggested scenarios
- ❖ Role of technology and external parties (banks and CiT companies) in enhancing the efficiency of cash handling procedures and reducing the risks involved
- ❖ Possibility of collaboration in cash handling between Kappe' and SAR (and other retailers at Amsterdam Airport Schiphol)
- ❖ Impact of trends of customers' choice of cash in payments on effectiveness of different scenarios

This research will **not** include:

- ❖ An optimization model to reduce inaccuracies in estimation of cash-in-between (start-up floats, cash holdings and change orders)
- ❖ Investigation of the factors causing the trends in cash payments

Figure 1 illustrates the scope of the research.

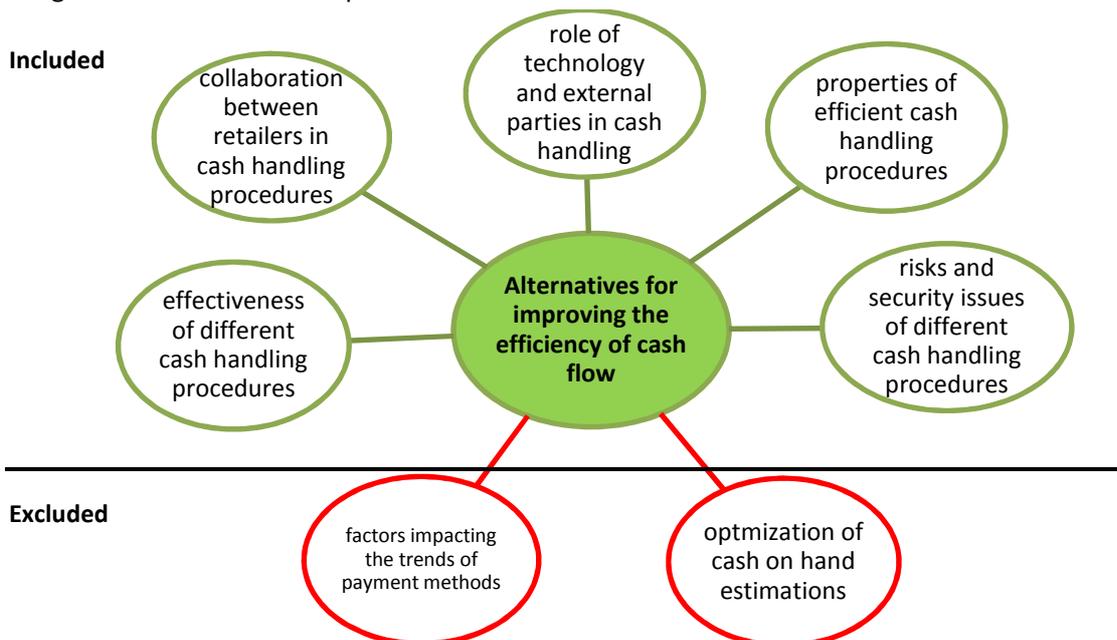


Figure 1: Research scope

1.4. Research questions

Considering the type of the research (case study) it is critical to find the factors underlying costs and degree of their influence. These will assist in developing alternatives and assessing them. The research questions can be broken down to a sequence of sub-questions. The sub-questions are in direct connection with the research objectives, and in line with the research approach, and they take note of the research methodology. The main research questions and their corresponding sub-questions are as follows.

1. What are the components/ determinants of costs of cash payment in the retail sector?

To answer this question, a literature review needs to be done. The answer will aid in identification and classification of factors that play a role in cash handling process and the associated costs. The discovered relationships will be displayed in a causal loop diagram. This diagram facilitates finding both common and process-specific sources of costs in terms of cash handling between different retail companies.

2. What are the current procedures for cash handling at Kappe' and SAR?

- What are the procedures for withdrawing and depositing the cash collected in the cash drawers?
- What are the procedures for providing the needed change with regards to amounts, currencies and denominations? How frequently is cash withdrawn/ ordered?
- How are insufficiencies in terms of total available float, denominations and currency type dealt with?
- Which CiT companies are used by Kappe' and SAR for cash handling services? To what extent are these services outsourced? What are the terms of contracts with these companies?
- What is fixed in the current scheme of cash handling? And what can be altered?

To answer question 2, information should be collected from the employees of Kappe' and SAR's shops as well as representatives of the companies. Observation of the processes can also be of great assistance. These answers will provide a clear picture of the current scheme of cash handling at Kappe' and SAR. This will can be used in comparing the cash handling procedure at Kappe' and SAR with other companies. It will also help identify potential areas of improvement.

3. Which factors and to what extent influence the costs of cash handling at Kappe' and SAR?

Based on the generic understanding of cash handling procedures at Kappe' and SAR, the sources of costs in these organizations can be identified using Activity-Based Costing.

4. What are the criteria for assessment of alternative solutions?

When this question has been answered, the measures for comparing different cash handling procedures and selecting the superior solution scenario will be established. In other words, it will be decided which criteria are of significance to the problem owners and what are their respective priorities. Specification of these criteria should be done with special attention for the expectations of Kappe' and SAR of an efficient cash handling process.

5. What alternative solutions can improve the efficiency of cash handling process? How do the alternative solutions compare with regards to the selected assessment criteria?

- What would be the impact of each alternative on the cash handling processes?
- How do the alternative solutions compare in terms of sources of costs?

The answer to this question will include different alternatives that can replace (or be merged with) the current scheme of cash handling. Successful procedures followed by other retail companies will assist in generating ideas. Stakeholder analysis will also assist in modifying the solutions to suit the case at hand. The impact of each solution in achieving a more efficient cash handling process with regards to previously selected criteria should then be assessed.

6. Which alternative(s) is (are) selected by Kappe' and SAR to enhance the efficiency of their processes? How should it (they) be implemented in practice?

The answer to question 6 will include the implementation approach that can help Kappe' and SAR to successfully embark upon more efficient cash handling processes.

7. How might Kappe' and SAR's choice of alternative change in the future?

- How would the alternatives be ranked for Kappe' and SAR with a multi-criteria decision making approach?
- How would the trends in share of cash as a payment instrument influence Kappe' and SAR's decision with regards to the suitable alternative?

By answering question 7, the research will be concluded. Recommendations to Kappe' and SAR for minor and/or major adjustments in their cash handling processes will be derived using a multi-criteria decision making technique. Attention will be paid to the trends in customer's choice of payment in the coming years and the expected effects on different cash handling procedures.

1.5. Research methodology

In order to answer the research questions, a number of methods are used to analyse the current situation, develop alternative solutions and finally evaluate their impact on improving the efficiency of cash handling processes at Kappe' and SAR. These methods are described below.

- ❖ **Activity-based costing:** Activity-Based Costing (ABC) is a method for developing cost estimates in which the project is subdivided into discrete quantifiable activities or a work unit".¹The project will be divided to work units. The costs of individual activities will be calculated and costs will be assigned to cost objects to identify sources of profits and losses and decide which areas need to be improved for a more efficient cash handling process.
- ❖ **Multi-criteria decision making:** "Multi-criteria decision making (MCDM) refers to making decisions in the presence of multiple, usually conflicting, criteria."² One of the methods used in MCDM is Analytic Hierarchy Process (AHP). AHP was developed by Saaty in 1970th. In this method, numerical pair-wise comparisons between criteria are used to derive the priority vector. The different alternatives are then assessed on the criteria and finally an overall ranking of them is attained.³This approach "organizes tangible and intangible factors in a systematic way, and provides a structured yet relatively simple solution to the decision-making problems".^{4,5}
- ❖ **Benchmarking:** Cash handling procedures at Kappe' and SAR will be compared to other companies and ideas suiting the case will be derived.
- ❖ **Lewin's change model:** Change model, developed by Lewin in 1940s, is a common thread for managing organizational change in three steps: unfreeze, change and refreeze.⁶

Table 1 shows the methodologies used in this research to answer each of the research questions.

Table 1: Research questions and research methodology

Research question	Methodology	Corresponding chapter
1. What are the components/ determinants of costs of cash payment in the retail sector?	Literature review	2
2. What are the current procedures for cash handling at Kappe' and SAR?	Interviews, observations and data collection	3
3. Which factors and to what extent influence the costs of cash handling at Kappe' and SAR?	Activity-Based costing	4
4. What are the criteria for assessment of alternative solutions? Which processes can contribute to the efficiency of cash handling?	Interviews, benchmarking	5
5. What alternatives solutions can improve the efficiency of cash handling process? In what terms does each alternative solution enhance the efficiency of cash handling process? How do these solutions compare?	Literature review, visiting retail fair and collecting information about different technologies , Activity-Based costing	6
6. Which changes in the current scheme of cash handling are recommended for enhancement of the process efficiency in practice? (Selection and implementation)	Discussion, feedback sessions, revision and modification, Lewin's change model	7
7. How might Kappe' and SAR's choice of alternative change in the future?	Analytic Hierarchy Process (multi-criteria analysis technique)	8

1.6. Data collection

Needed data is both quantitative and qualitative and will be collected from a number of sources. Interviews with financial and security managers of Kappe' and SAR will assist in understanding the general scheme of money flow at each organization. Such data can play an explanatory role in finding the factors that lead to high costs of cash handling. Observations of the procedure at the stores, recording the details about working shifts, the efficiency and reliability of employee and congruence with the standards presumed by the high-level officials will be helpful in complete understanding of the current situation. Terms of contract of Kappe' and SAR with ABN-AMRO and GWK-Travellex are also expected to be of assistance.

In addition to the aforementioned sources, information collected through interviews from the employees of Kappe' and SAR and data on transactions count and volume will clarify the process. Archival records of the organizations will be used to study the possible changes that have occurred in the processes and their impacts. Literatures in several fields are useful in selecting areas of focus and collecting the needed data.

1.7. Research structure

In order to recommend solutions for enhancing the efficiency of cash handling at Kappe' and SAR, a sequence of steps will be followed. These steps make it possible to start from the research problem

and achieve the research objectives. During this process, assistance will be sought from relevant literature and efficient cash handling procedure of other retail organizations as benchmarks. Figure 2 depicts the step-wise approach followed.

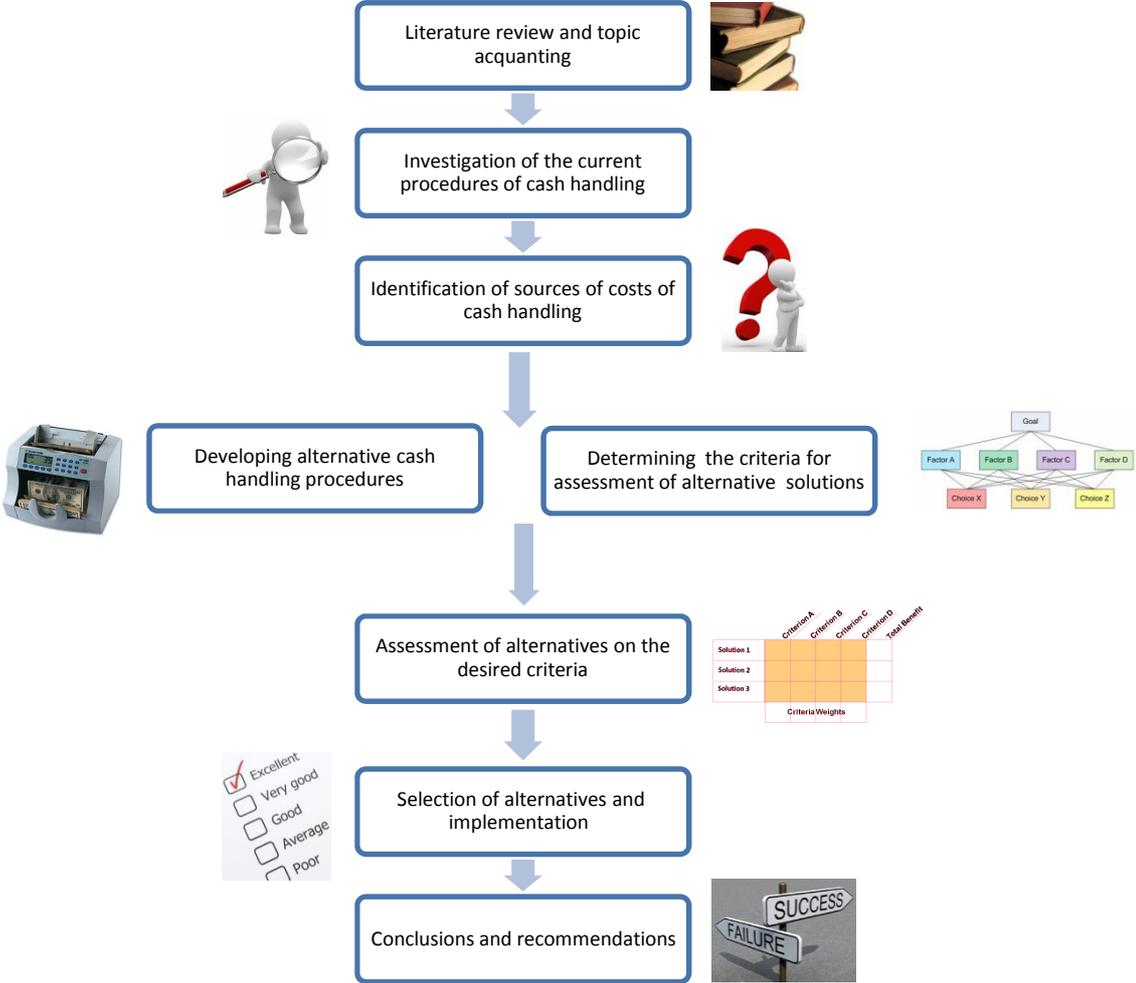


Figure 2: Research approach

Summation

This chapter serves as the proposal for research on "Alternative solutions for improving the efficiency of cash handling processes for retail stores at Amsterdam Airport Schiphol". As explained, the problem originates from organizational and technological inefficiencies of and detachment between cash handling processes at Kappe' and SAR.

Once the problem was clearly formulated and the objective set, the scope of the research was defined and a sequence of research questions was developed in a step-wise approach. In this approach by understanding the sources of costs in the current processes, and with attention for success criteria alternative cash handling solutions can be developed and assessed. After that, the research will be focused on re-assessment of selected alternatives. Finally, conclusions can be drawn based on the answers to research questions and recommendations can be provided for future decisions.

Chapter 2:

Cash payments and costs components in cash handling processes

Despite the advances in electronic payment methods, cash is still widely used in transactions. By the end of 2009, the volume of cash in transaction in Europe had risen to more than € 796 billion. While cash is a popular form of payment among both customers and merchants, evidence especially across retail sector shows that cash payments can be followed by large costs for different parties involved. In this chapter, firstly commonality of cash payments and factors driving it will be elaborated on with a literature review. Then, costs of handling cash will be investigated and the components will be projected in a causal relations diagram. These will provide the answer to the first research question that is "what are the components/ determinants of costs of cash payment in the retail sector?" Figure 3 shows the focus of chapter 2 as part of the research.

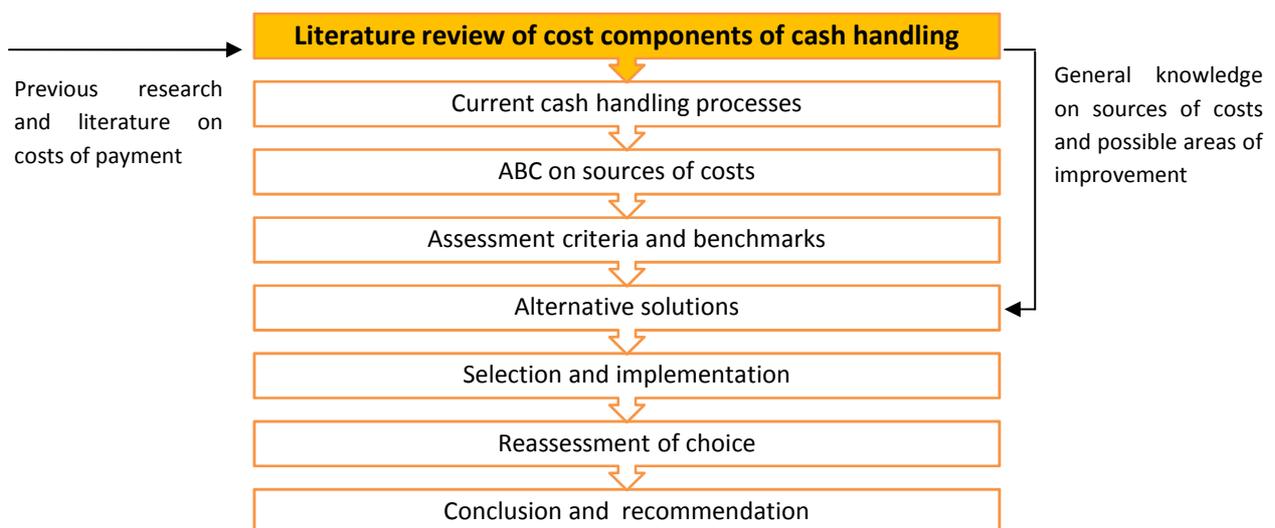


Figure 3: Focus of chapter 2

2.1. Popularity of cash

The volume of cash among retail payment instruments is dissimilar in different countries. In the Netherlands in 2009, cash accounted for about 48% of the total volume of transactions in the retail sector.

In 2010 in the Netherlands, a total of 7.4 billion payments were made by consumers by means of cash, debit cards, prepaid cards or credit cards; 4.4 billion of which were done in cash. Cash is primarily used for minor purchases and the total values of cash payments in 2010 amounted to 62 billion. Due to the increasing use of debit cards among the Dutch consumers, a 17% decline (from 5.2 billion to 4.4 billion) in the number of POS payments has been recorded between 2007 and 2010. A rise from 23% to 32% in the debit card POS payments and at the same time a fall from 74% to 65% in

cash POS payment is a testimony to this claim. In terms of payment values, the trend is less steep. A 3% increase for debit card payments (56% to 59%) in line with a decrease of the same magnitude (from 41% to 38%) for cash payments has been reported.⁷

The decline in numbers is much higher than the fall in the value of the payments (charts in Figure 4). The reason for this is claimed to be more use of debit cards rather than cash for small payments. Therefore, it can be concluded that the total value of payment influences the choice of the payment method. While small amounts are usually paid by cash, debit cards are preferred for larger transactions. However, this trend has also been changing through the years. Figure 5 depicts the variations in the choice of payment method by the total transaction value from 2007 to 2010.⁸

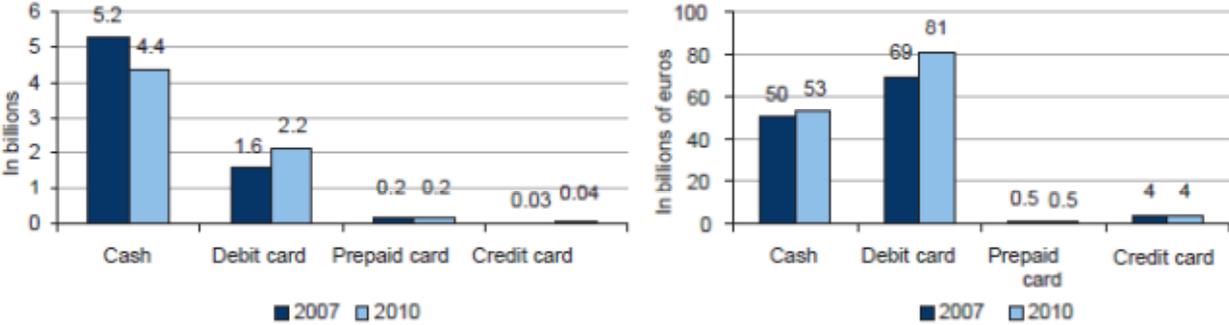


Figure 4: Number and Value of PoS payments in 2007 and 2010⁸

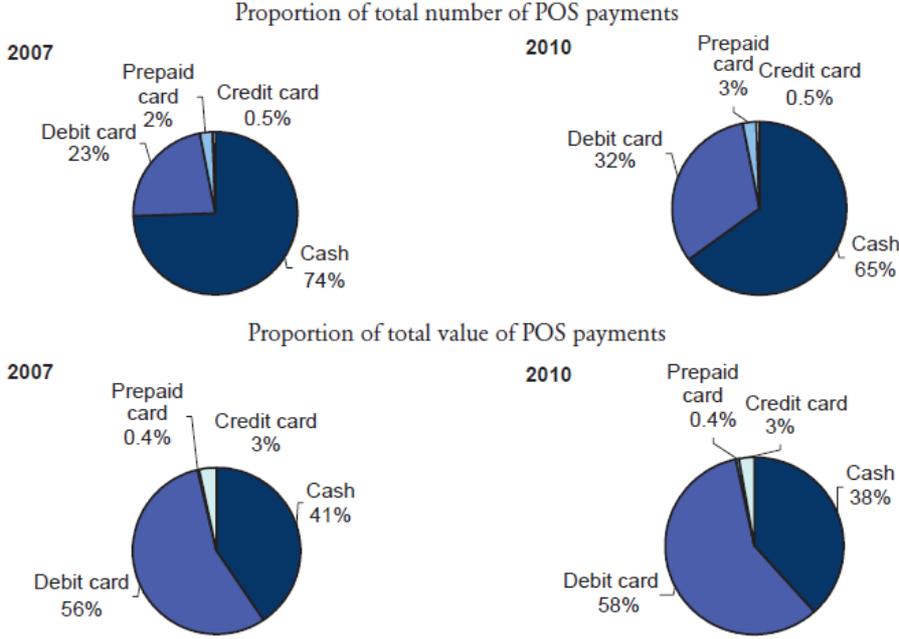


Figure 5: Usage of PoS payment instruments in 2007 and 2010⁸

Another factor that influences the use of cash is the market segment in which purchases are made. In some segments cash seems to be the dominant payment method compared to other methods.⁸As shown by the statistics of European Central Bank (ECB), the amount of cash in use within the Euro zone has had an effective annual average rise of 11% since the introduction of Euro in 2002. According to a recent study by Dutch National Bank (DNB), 72% of the total annual transactions are

cash transactions (5.5 billion out of 7.6 billion). The 2009 figures demonstrate that cash payments to the retailers account for 51.8% of the total estimated cash payments in the Netherlands.⁹

2.1.1. Popularity of cash among consumers

A number of factors play a role in consumers' choice of payment instruments. Among these are geographic residence location, age, level of education, income, social background, and employment status. The value of transaction and type of purchase as mentioned before are also of significance. In many cases consumers continue to use cash rather than other payment instruments. The reasons behind this are:

- **Anonymity:** According to some European studies, the amount of cash used in a country corresponds to the scale of informal economy. With an informal economy of €60 billion, the Netherlands' informal economy is about 10% of its GNP. This shows the appeal of cash as a payment method that, unlike electronic payment instruments, does not allow for tracing of activities. Incidentally, in the formal economy full transparency of the transactions is also undesirable. Thus, anonymity of cash is one of the reasons for its popularity as a means of payment.
- **Directness:** One of the other advantages of cash payments is that they eliminate the need to third parties. In addition, they can easily be reversed within a period after the transaction.
- **Certainty:** A growing group of consumers view cash as a stable payment instrument especially in times of uncertainty of the financial system.
- **(Un) safety:** Despite its less practicality in carrying and potential risks of robbery, cash is still perceived by many as a safe payment method. This can be attributed to lower perceived likelihood of being a victim of an incident as well as lesser severity of the consequences of such cases.
- **Being tangible:** Cash is a convenient means of payment that has more aesthetic components and is accompanied with a more responsible attitude by many consumers.⁹

2.1.2. Acceptance of cash by retailers

The costs and benefits of accepting different payment methods might vary among merchants depending on:

- Size of merchant
- Industry sector⁸
- Typical payment method and value of transaction⁹
- Set of payment instruments available to customers⁷

Accepting cash in payments, like other payment methods, has both advantages and disadvantages for retailers. While liquidity makes cash appealing to them, it is associated with a number of problems including risk of theft, robbery and counterfeiting, and human error during manual exchanges and reconciliations.¹⁰ Costs of cash are discussed below.

2.2. Costs of cash payments

Costs of cash payments can be classified as social costs and private costs. Social costs are "the costs of the resources, in terms of capital and labour, which are put into the production of payment

services". Social costs consist of all internal costs made by the relevant parties (the central bank, the banking sector, the retail sector and consumers) in the payment chain in order to carry out POS transactions.¹⁰ Private costs refer to all the costs incurred by the relevant individual parties in the payment chain.⁷ External costs on the other hand, are payments (fees/tariffs etc.) charged to other parties in the payment chain.¹⁰

The largest part of private costs of retail payment instruments is born by the retailers (0.59 % of GDP).⁷ As Table 2 shows, retailers undergo also a large part of the social costs of different payment instruments in the Netherlands.

Table 2: Results of European Central Bank studies on payment instruments ⁷

Payment chain participants	Social costs as a percentage of GDP	
	Dutch report	European study
Banks	0.31	0.21
Retailers	0.32	0.19
Royal Dutch Mint /Central Bank	0.02	0.03
Total	0.65	0.42

According to a survey by Arango and Taylor the variable costs of credit cards, debit cards and cash consist of the following items:

- The labour cost of tender time
- The labour cost of cash reconciliation, deposit preparation, and deposit delivery to the bank
- Cash-deposit and coin-ordering fees
- The per transaction fees for processing debit and credit card payments
- The cost of cash theft and losses as a result of counterfeiting¹⁰
- The cost of a credit card chargeback
- The opportunity cost of funds in transit¹ based on short-term interest rates.¹¹

This shows that cash is the most expensive on many of the listed cost items especially those for performing which merchants rely on employee or third parties.

2.2.1. Consumers' costs of cash

For consumers, costs of cash (social costs of retail payment) are the product of:

- fees paid for cash withdrawals from ATMs (in case of using currencies other than those accepted by the retailer)
- personal costs of holding cash in possession such as risk of robbery
- seigniorage (interest rate costs from holding liquidity).¹²

Considering the scope of the research, consumers' costs of cash are not of direct relevance in this study. Therefore, the next section will be focusing on retailers' costs of cash and their components.

¹ "For cash, this refers to the time it takes for the financial institution to credit the merchant's account and the average time total cash sales remain in the store before being deposited at a financial institution."

2.2.2. Retailers' costs of cash

The flow of money at retail shops is often a timely and costly process. Reconciling cash drawers, counting, and preparing cash for pick up, forecasting demand and maintaining till floats are some of the activities entailed in the cash handling process. Apart from the high workload, large costs, and security issues, transparency of the cash cycle is also an area of concern.¹³

According to a study by ECB in 2012, costs are, on average, higher for retailers than banks and infrastructures, with 0.587% and 0.493% of GDP respectively. This reveals that fees and tariffs paid by retailers to third parties (namely CiT companies) constitute a significant part of their costs (about 0.15% of GDP on average).⁷

An investigation into the cash centre environment revealed that it consists of a unique combination of pure service and pure manufacturing.¹⁴ Whether fixed or variable, explicit (i.e. fees paid to third parties) or inexplicit (i.e. labour costs) costs of cash handling are large. These costs make cash the most labour-intensive form of payment.¹¹

For the retail sector, costs can be divided to two categories: back-office and front-office costs. Back-office costs relate to preparation, emptying and balancing cash registers, cash management, preparing daily receipts to be deposited, procurement of small change and cash register rolls and all underlying administrative activities. Back office costs of handling cash account for 43% of the total handling cost of all payment methods (debit, credit, e-purse).¹⁰

The cost items of cash handling for the retail sector and subcontractor can be listed as:

- Cash deposits and withdrawals in bank branches
- PoS cashier operations to handle cash from the customers
- Back office functions including processing of cash from cash payment transactions (counting, sorting, preparation of change floats, cash registers for cash, etc.)
- Storage and transport of cash to the banks or to the cash centres
- Security for cash operations¹²

Several attempts have been made to answer the question "Should cash management services be outsourced?" According to Jack Large of J&W Associates, it is only the degree of outsourcing that is the point of discussion, not outsourcing itself. Once cash services are different from a company's core activities, outsourcing them is considered beneficial from some aspects. Among these are, freeing up resources for more essential investment opportunities, achieving economies of scale and more availability of employees for core activities.¹⁵ An increase in costs is inevitable in case of outsourcing cash handling services. A previous survey by Ernst and Young (1999) revealed a growth from 7 to \$10 billion in revenues from cash management. In application of lean manufacturing tools in cash centres to improve operational efficiency, it is suggested to make a shift from push to pull cash system to reduce the discrepancies between value propositions of CiT companies and retailers. Moreover, smaller feedback loops of demand planning and forecasting are expected to enhance the efficiency of the process through more accuracy of payrolls and floats.¹⁴

Some retailers make use of Professional Cash handlers (PHC) or CiT companies to carry out some of these activities. These financial institutions charge fees for deposits and change (coin or smaller denomination) orders. Installing automated cash recyclers and software solutions would also help

reduce the amount of time spent by employees on cash handling. Although the investment costs of such technologies can possibly be recovered over the life span of the machine, they still impose large costs up-front and call for training of employees.

Regardless of the distribution of cash handling activities among employee and CiTs and presence or absence of technological solutions, retailers maintain a level cash safety stock. For large retailers, this amount is separate from the till floats. They are intended to supply cashiers with coin, small denominations and in some cases other currencies. On the other hand, the collected cash that exceeds the total till floats and safety stock might be waiting for a few days at the store before being deposited. Consequently, the opportunity cost of lost "interest on cash holdings in registers or vaults or while it is in transit" are also part of the costs incurred by retailers.^{11 12}

Differences in prices and terms of contracts for cash management services call for periodic evaluation of the available external parties. Furthermore, high overhead and operating costs of such outsourcing, confidentiality and security issues in addition to possible downsizing of employees and its negative effect on a retailer's morale might act as incentives to a reconsideration of outsourcing cash handling services, or even in-house execution of them.¹⁵

All these problems give incentive for a study on possible scenarios for optimization of flow of cash at retail stores. A number of literatures have previously been dedicated to developing and assessing algorithms for cash management optimization. Cramer's algorithm on efficient payment schemes¹⁶ and ANN¹-based algorithms¹⁷ are two examples.

The results of literature review on costs of cash payments is shown as a causal relations diagram shown in Figure 6.

¹ Artificial Neural Networks

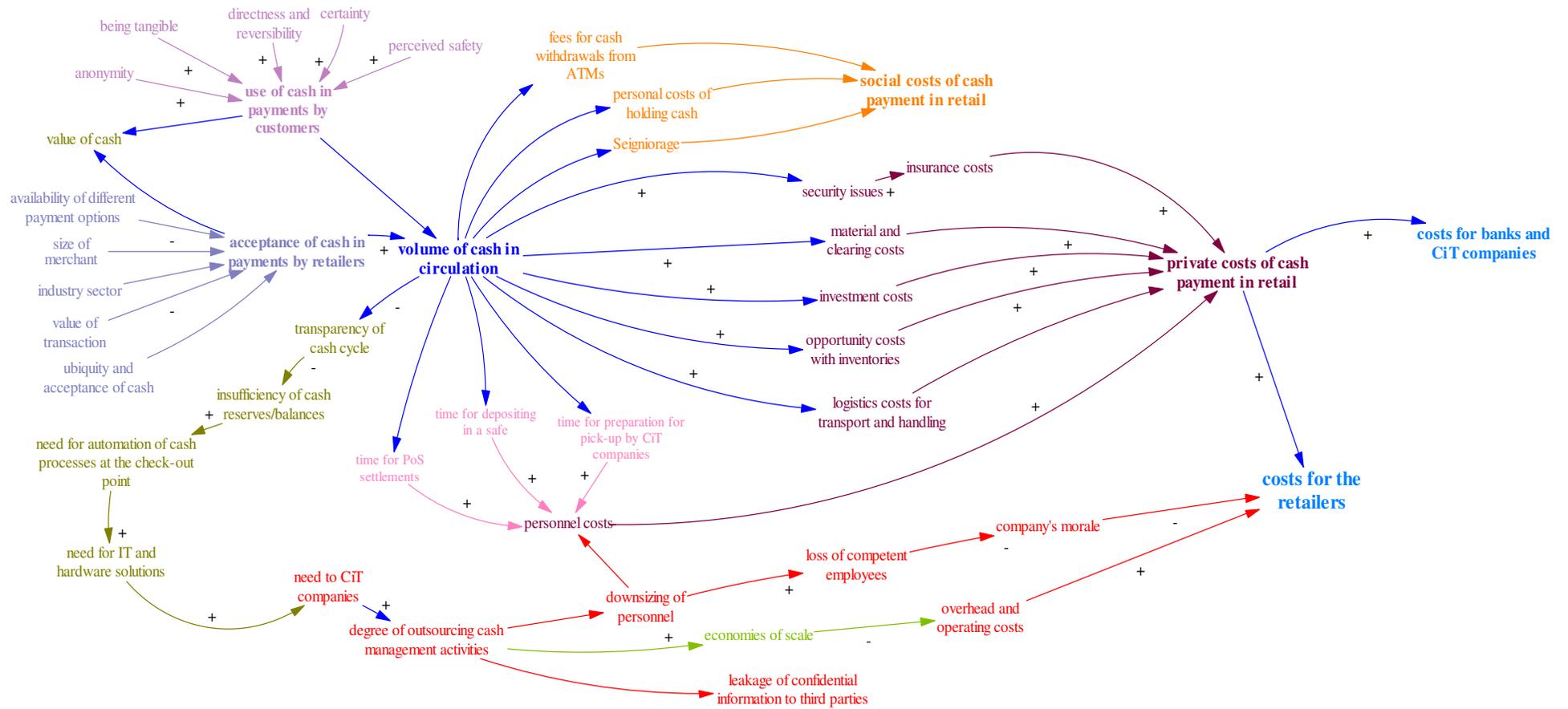


Figure 6: Causal relations diagram for costs of cash payments

Summation

In this chapter, the results of a literature review on cash payments were presented. Firstly, the volume and value of cash in payments in Europe and the Netherlands were studied. As found in some studies 72% of transactions in the Netherlands are still done in cash. This popularity of cash among consumers can be attributed to several factors including its anonymity and directness. For retailers, acceptance of cash differs depending, among others, on size of merchant, industry sector and value of transactions.

In the next part, costs of this form of payment were classified as social and private. The focus of the research at hand is the costs to the retailers which belong to the latter category. The major constituents of this category are found to be investment costs, logistic costs, security costs and staff costs. In chapter 3, the current processes of handling cash at Kappe' and SAR will be analyzed. Then, based on the acquired insight and also the cost components identified in this chapter, main sources of costs at Kappe' and SAR can be derived.

Chapter 3:

Current cash handling procedures at Kappe' and SAR

In general, the process of cash handling begins with start-up floats to be used as change in cash transactions. Additional change may be needed during the shifts and these might be provided from different sources. Some retailers use a safety stock basin or a cash dispensing machine while some others require their employee to visit the bank counter in person. In this chapter current cash handling procedures at Kappe' and SAR are analyzed. Figure 7 shows the focus of chapter 3 as part of the research.

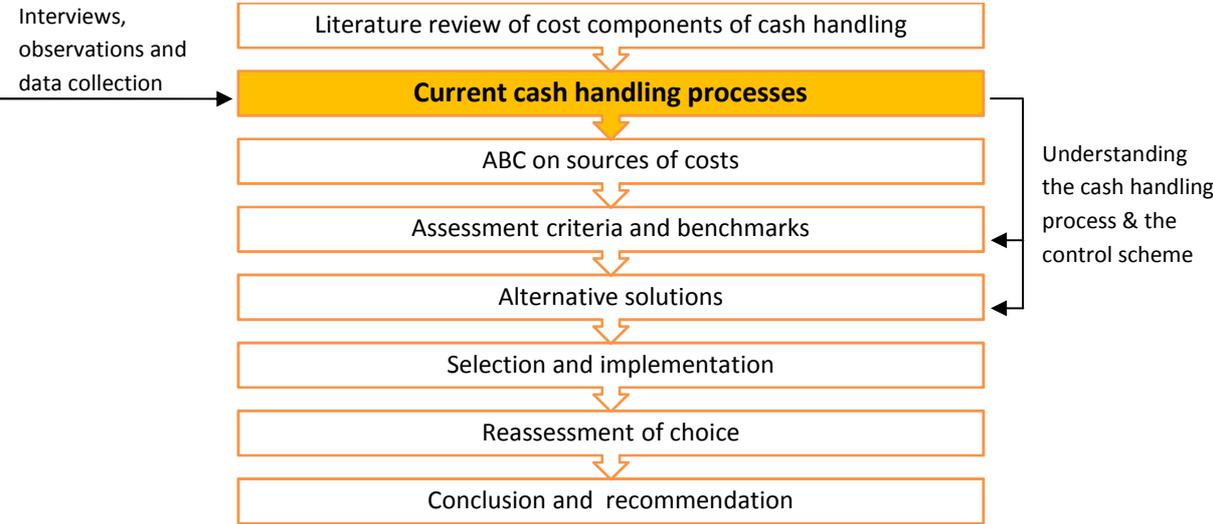


Figure 7: Focus of chapter 3

Figure 8 shows a basic cash handling process. In this process ordered amounts (usually coins and small denominations of notes) are withdrawn from the retailers account and delivered to the stores by a CiT company. After reconciliation, till floats are provided and daily transactions begin. The money collected from the customers is stored in the till until the end of the day when these amounts are counted in the back office. Once reconciled with the record of daily sales, till floats required for the next day are maintained in a safe. The excess cash is prepared for pick-up by CiT Company. In addition, amount of additional change required is communicated to the CiT Company. CiT Company delivers these amounts to the stores and picks up the excess cash to deposit in the retailer's bank account.

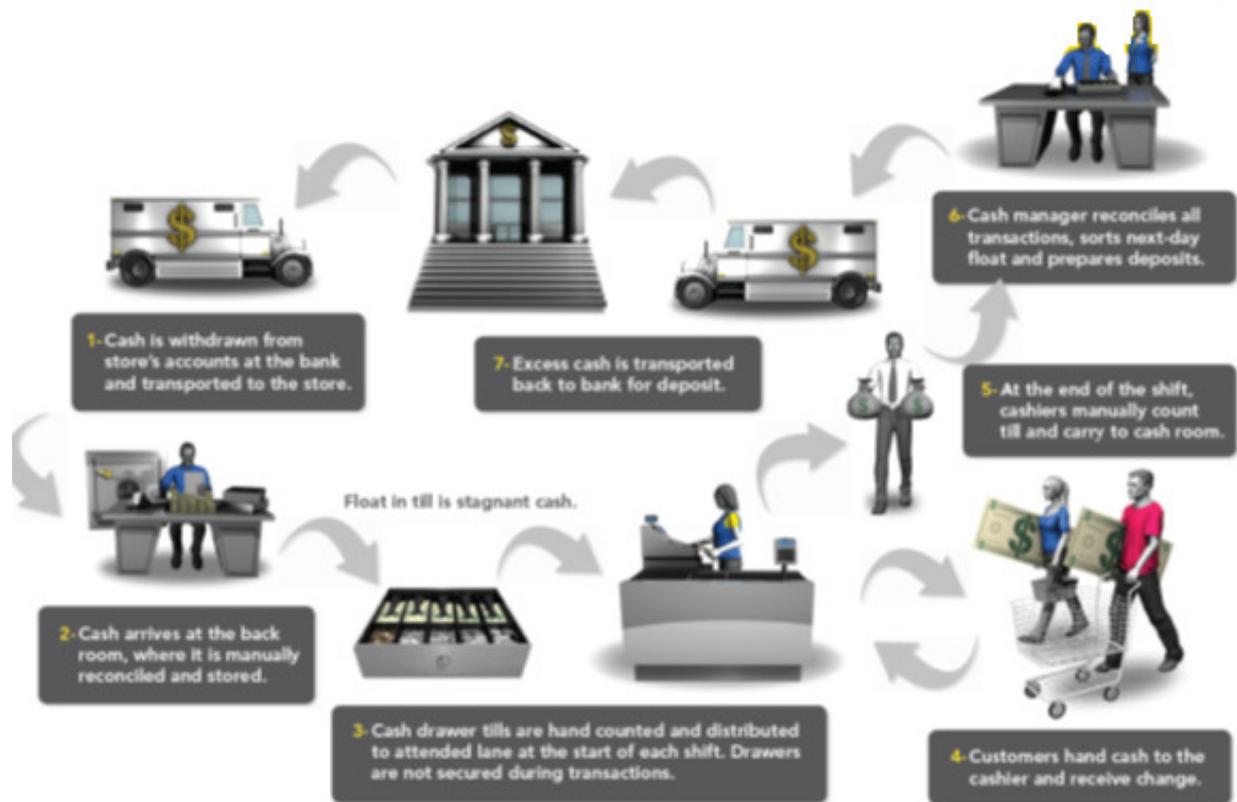


Figure 8: General scheme of cash handling¹⁸

Retailers have different strategies in dealing with cash. For security reasons, some store high-denomination notes in a separate area of their drawers namely an air box or a drop-in safe. These are later prepared for depositing at the bank or pick-up by CiT companies either separately or as a bulk of cash. On the other hand, smaller denominations are maintained as floats for the next shifts. Such a circulation aims to reduce the need for change orders and its concomitant issues (e.g. large amounts of cash-in-between, increased handling time and enlarged outsourcing costs). Also, in order to reduce the frequency of change stock-outs, sales employee tries to use a good change combination in transactions. Smart check-out counters can facilitate this process. However, many still rely on skills of employee (learning by doing). Despite such measures, more low-denomination bills and coins are given to customers than collected from them. Therefore, ordering change is inevitable for the retailers and it is only the frequency and amount that can be altered when it comes to enhancing the efficiency of the cash handling process.

There has been much advancement in automation of cash solutions. Automatic cash recyclers, cash dispensers and reconciliation softwares are some examples. Such tools, expedite or eliminate the cash activities done by employees at the start and end of their shifts, improve security, increase the transparency of the cash cycle and reduce the problems in providing additional floats during the working shifts.¹⁸

As two retailers functioning in Amsterdam Airport Schiphol, Kappe' and SAR have their specific cash handling procedures. According to their agreement with Schiphol a number of currencies are accepted at the cash registers of Kappe and SAR (including Swedish and Norwegian Krone, Swiss Francs, Japanese Yen, Australian Dollars). Change is nevertheless only offered in Euros, Dollars and in

cases, Pounds. Kappe' and SAR have respectively 12 and 7 stores at Schiphol. Out of the 12 stores of Kappe', 5 are run using a rather new method of cash handling while the other 7 are still using the older process. SAR also has its own cash handling process which differs from those of Kappe' in a number of ways. Overall, three procedures of cash handling have been identified at the two companies' stores. A detailed description of these procedures and their differences follows.

1.1. Payment methods at Schiphol

Considering the position of Amsterdam Airport Schiphol as an international hub as well as destination, it is only logical for shops to offer a wide possibility of payment methods. Therefore, shoppers can select the method that they find most convenient. In non-cash transactions bank cards, American Express, Maestro, MasterCard, and Visa are among the acceptable cards. Moreover, it is possible to use Traveller's cheques (up to €100) and Buy Fly vouchers at some shops. On the other hand, cash payments are accepted in Euros, US dollars, pound sterling and Japanese yen as well as some other currencies. The change will be given in Euros (also US dollars and British Pounds in some cases).¹⁹

1.2. Financial institutes at Schiphol

Many travellers would like to exchange their cash for foreign currencies or travellers cheques. Similar to other international airports, exchange services are available at Amsterdam Airport Schiphol. ABN-AMRO²⁰ and GWK-Travellex²¹ are the two parties active at the airport. Apart from exchange services for travellers, they offer a number of services to the retail groups present at the airport. G4S has recently started operating at the airport as well. It is such services that are of interest for the purpose of this study.

Among the services offered by ABN-AMRO and GWK-Travellex at Schiphol, are processing of cash and non-cash payments at the shops within the airport. These services vary depending on the cash handling procedures followed by the functioning retailers. With regard to cash, these could range from exchanges to smaller denominations and other currencies, delivery of change orders, and pick-up and processing of deposited seal bags.

Availability of only two financial institutes at Schiphol reduces the bargaining power of retailers. In addition, Fees are charged either on the basis of number and type of seal bags deposited or (a percentage of) the total value of annual transactions. These terms of contract are not always apt for the cash handling procedures of retailers (Kappe' and SAR in the study at hand). Furthermore, the prices are rising further, making cash handling processes even more costly for Kappe' and SAR.

1.3. Map

Shops of Kappe' and SAR in each lounge are listed in Table 3 and shown in Figure 9.

Table 3: Shops of Kappe' and SAR in departure lounges

Company	Lounge 1	Lounge 2	Lounge 3&4
Kappe'	PE Schengen BC-pier Rituals Sunglasses Schengen Promo Schengen	P&C Centraal Sunglasses Centraal MAC Centraal	P&C west (dispensers' location) Sunglasses West Drugstore West Branded SBF
SAR	Zuid Whiskey & Cigars Confectionary L1	Centraal	West FS&C Confectionary L3

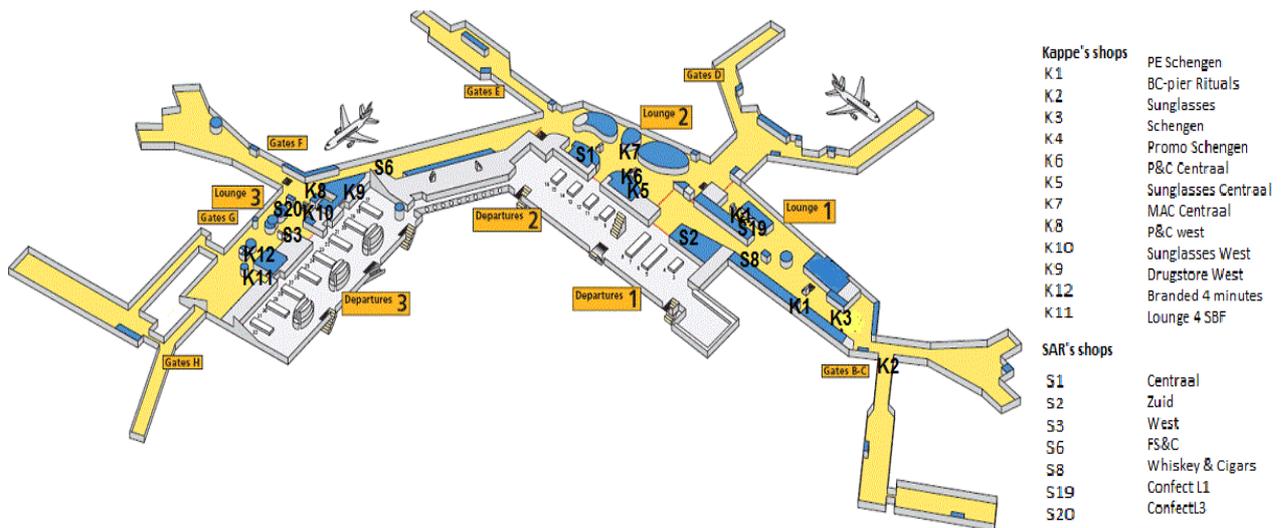


Figure 9: Location of shops of Kappe' and SAR in departure lounges at Amsterdam Airport Schiphol ²²

1.4. Cash handling processes

1.4.1. Cash handling at Kappe's stores

Kappe has 12 stores in Amsterdam Airport Schiphol. In Kappe's system, change is only offered in Euros and Dollars (and Pounds when available). Traveller's checks are not accepted by Kappe. Its contract with ABN-AMRO is based on the number of seal bags handed in. As of April 1st 2013 a new contract is started right after the previous one ends. Terms of both contracts are included in Table 4.

Table 4: Kappe's contracts with ABN-AMRO

contract period	Type of seal bags	number of seal bags	price per seal bag (€)	Terms of compensation ¹
ending 31-3-2013	€	0-9000	1.50	N/A
		9000-24000	3.50	
		> 24000	6.00	
	Foreign	any	1.00	1% of the value of foreign currency (in €)
starting 1-4-2013	€	any	3.25	N/A
	Foreign	any	3.25	2% of the value of foreign currency (in €)

Seven of Kappe's stores located in lounges 1 and 2, are run using an old system while 5 stores in lounges 3 and 4 rely on a rather up-to-date procedure for cash handling. These systems are described in detail below.

1.4.1.1. Kappe's old system

The seven stores located in Lounges 1 and 2 are run using an old system. ¹¹ In this system coins needed to provide till floats are reordered every 3 weeks and stored in a central location at Schiphol to be provided to Kappe's employee through Automated Teller Safes. At the beginning of the shift, each of the employees counts the starting float and reconciles the number with the amounts recorded by the previous shift's personnel. During the shift if smaller denominations, coins or other currencies are needed, one of the employees personally visits the bank counter. This results in a daily average of 2 bank visits per shop. These transactions will be reconciled by the store manager. At the end of each shift, each employee counts the collected amounts and retains a certain amount in a seal bag. This will be the start-up float for one employee from the next shift. The rest of the money is deposited by every employee individually at the close-by ABN office at Schiphol before leaving. This results in another 52 visits per day to the bank. Figures 10 and 11 show the cash handling process at Kappe's old system and its control scheme.

¹ Compensation is the partial refund paid for foreign currencies deposited to ABN-AMRO. It is a percentage of the Euro equivalent value of foreign currencies deposited. In this report some figures are specified as "before compensation" and some others as "after compensation". It is noteworthy that the final costs incurred by the retailer are those denoted as "after compensation".

¹¹ The list also includes Promo Chanel for the short period of September and October 2012

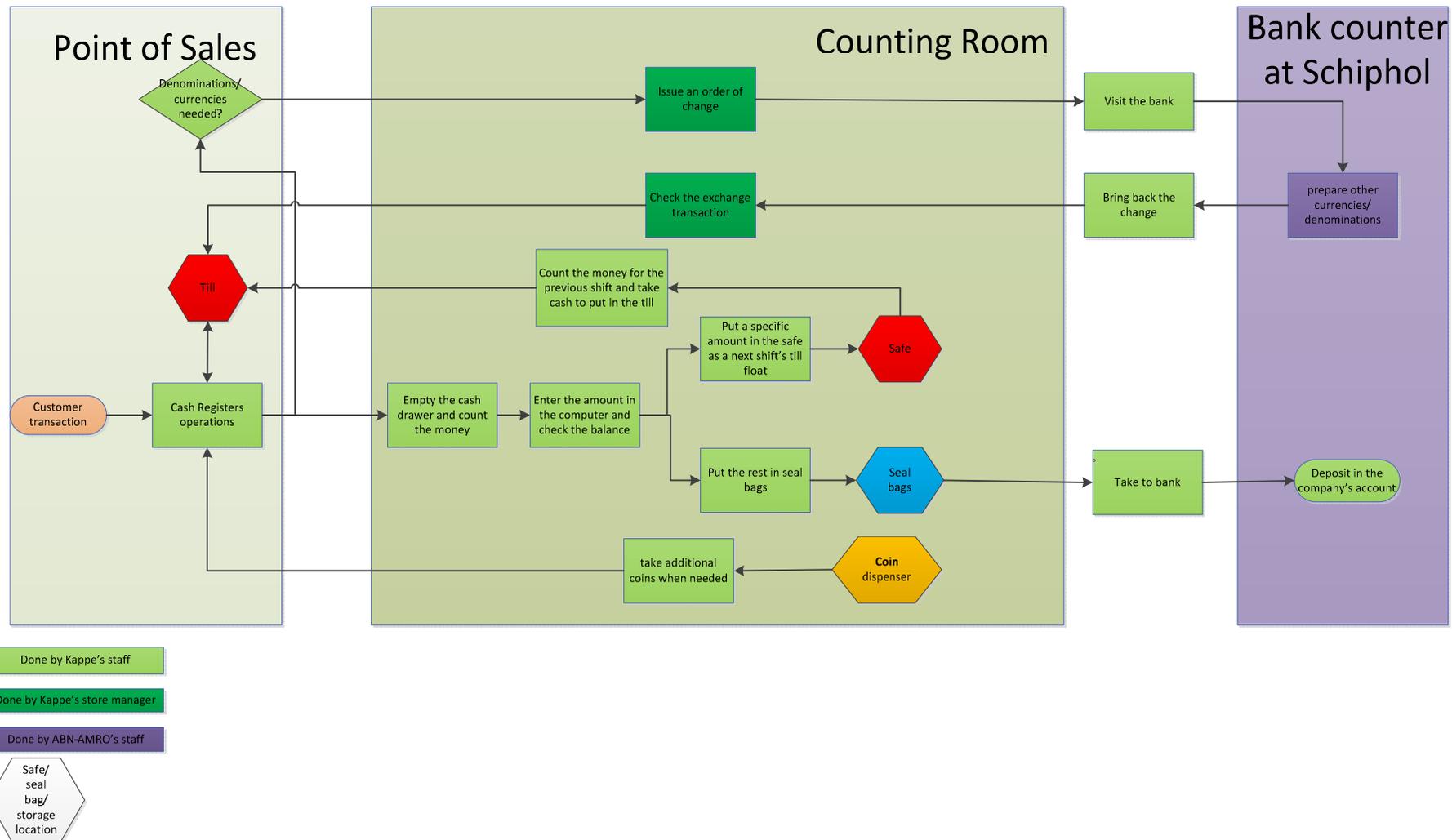


Figure 10: Current cash handling process at Kappe' in Lounges 1 and 2

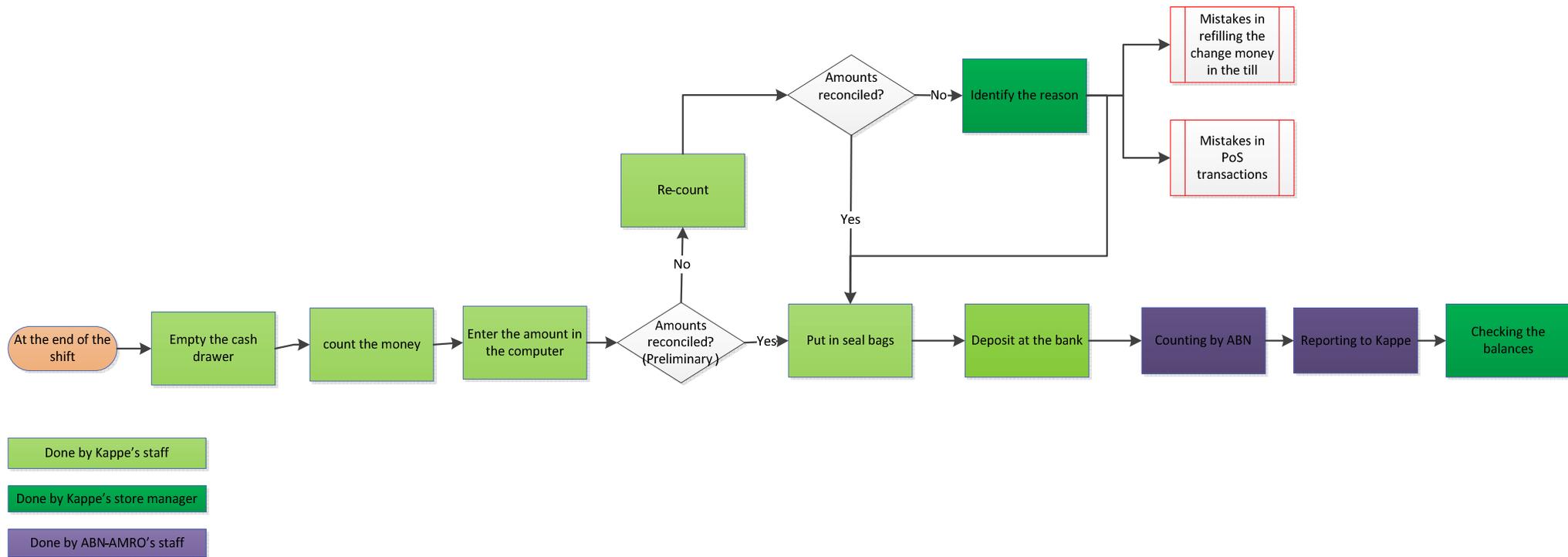


Figure 11: Control scheme for current cash handling process at Kappe' in Lounges 1 and 2

1.4.1.2. Kappe's new system

New note dispenser/ depositor and coin dispensers are installed in the store "P&C West". These machines are used as parts of the new system which is used in the 5 stores located in lounges 3 and 4. These are P&C West, Sunglasses West, and Drugstore West (in lounge 3) in addition to Branded and SBF (in lounge 4). At the beginning of shifts, employees travel to P&C West and withdraw their start-up floats from the coin and note dispensers located there. At the end of their shifts, employees travel back to P&C West to deposit the money in the machines. The money collected in the machine is deposited at the bank office every 3-4 days depending on the amounts of seasonal sales. Coin and note machine are checked by the store manager and orders are placed for refilling them when needed. These orders are almost never needed for the note machine considering the €2500 maintained as safety stock mostly in small denominations. When there is a need for additional change, employees contact those who would be starting their shifts shortly to withdraw the required amount from the machine. Figures 12 and 13 show the cash handling process at Kappe's new system and its control scheme.

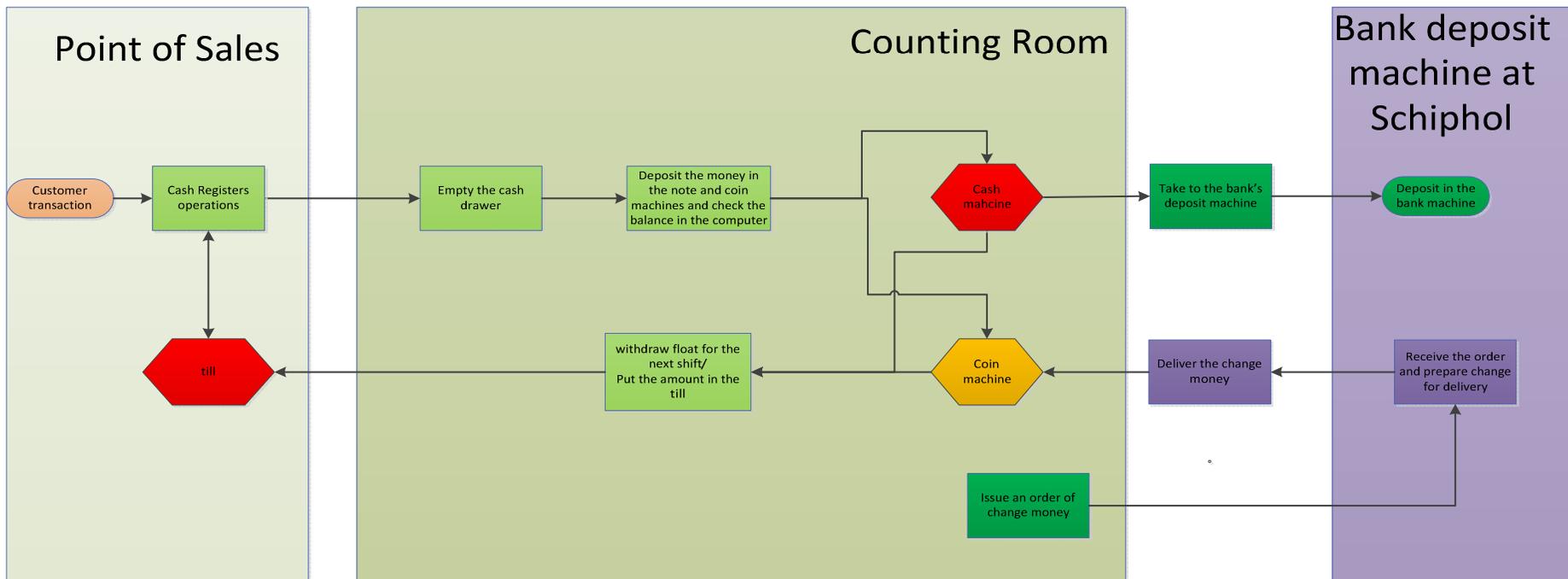


Figure 12: Current cash handling process at Kappe' in Lounges 3&4

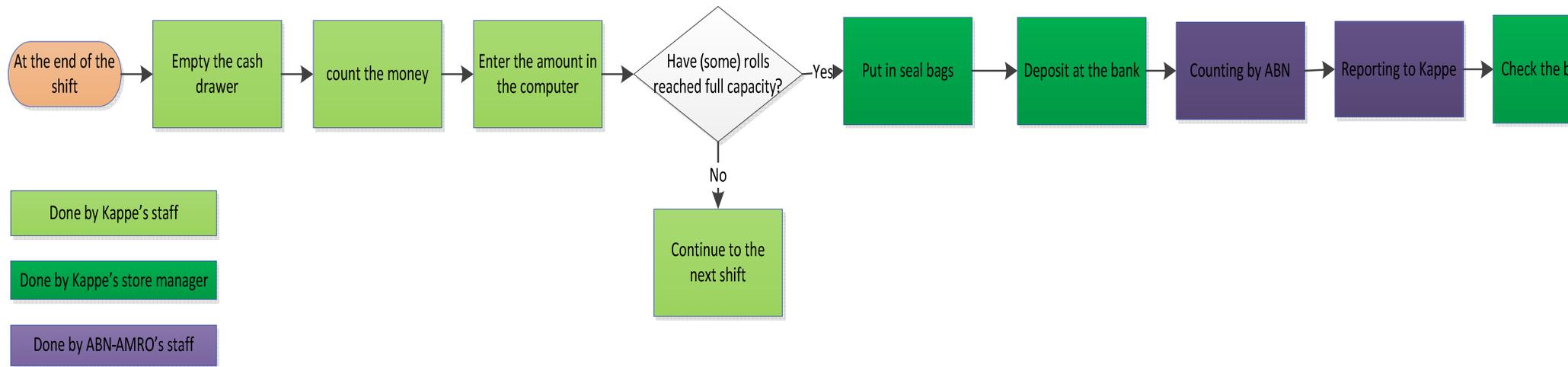


Figure 13: Control scheme for current cash handling process at Kappe' in Lounges 3&4

1.4.2. Cash handling at SAR's stores

SAR has 7 stores at Amsterdam Airport Schiphol. At these stores, transactions are possible in the currencies agreed with Schiphol Group. Change is offered in Euros, Dollars and Pounds. SAR has outsourced its cash handling activities between the stores and the bank to GWK-Travellex. For the employees in SAR's store, a shift starts with individual red seal bags. These seal bags contain start-up floats provided using a part of the money collected in transactions and are prepared by each employee themselves at the end of their previous working shift. After the customer transactions take place during the shift, the shift ends with the employee emptying the tills in the back office counting room. They in turn, prepare a portion of the money as till floats for their next shift and keep their red seal bags in a safe. The start-up floats amount to between €400 and €500. All the coins are preserved in the red seal bags. This coin recycling process reduces the need for frequent coin orders to be delivered by GWK-Travellex. The rest of the money in the till is also counted and put in blue seal bags to be collected by GWK-Travellex's CVIT vans¹. The counted amounts are then entered to the computer and reconciled with the corresponding sales records and start-up floats. Once GWK-Travellex has processed the collected amounts, reports are sent to SAR. This will enable the store supervisor to carry out the final step of reconciliation and track sources of fraud or mistakes in case of discrepancies.

If employees need additional floats (coins, smaller denominations or other currencies) during the shifts, the present supervisor (or a trusted employee) can provide them with the needed amounts from the safety stock basin. In the past at least one supervisor was present during each of the three working shifts. Nowadays, three supervisory positions are defined for each store, but there are shifts during which none of the supervisors is present in the store. This may also be true during cash collection periods by employee of GWK-Travellex and can make it difficult to identify sources of cash shrinkage.

As mentioned, coins are not handed over to GWK-Travellex in the blue seal bags, but rather kept in the red seal bags. The additional amounts of change needed are determined each day and faxed to GWK-Travellex. The needed amounts in different currencies and denominations are estimated merely on the basis of experience, intuition and speculation. Figure 14 shows the current cash handling process at SAR and Figure 15 depicts the control scheme for this process.

¹ Waardetransporter

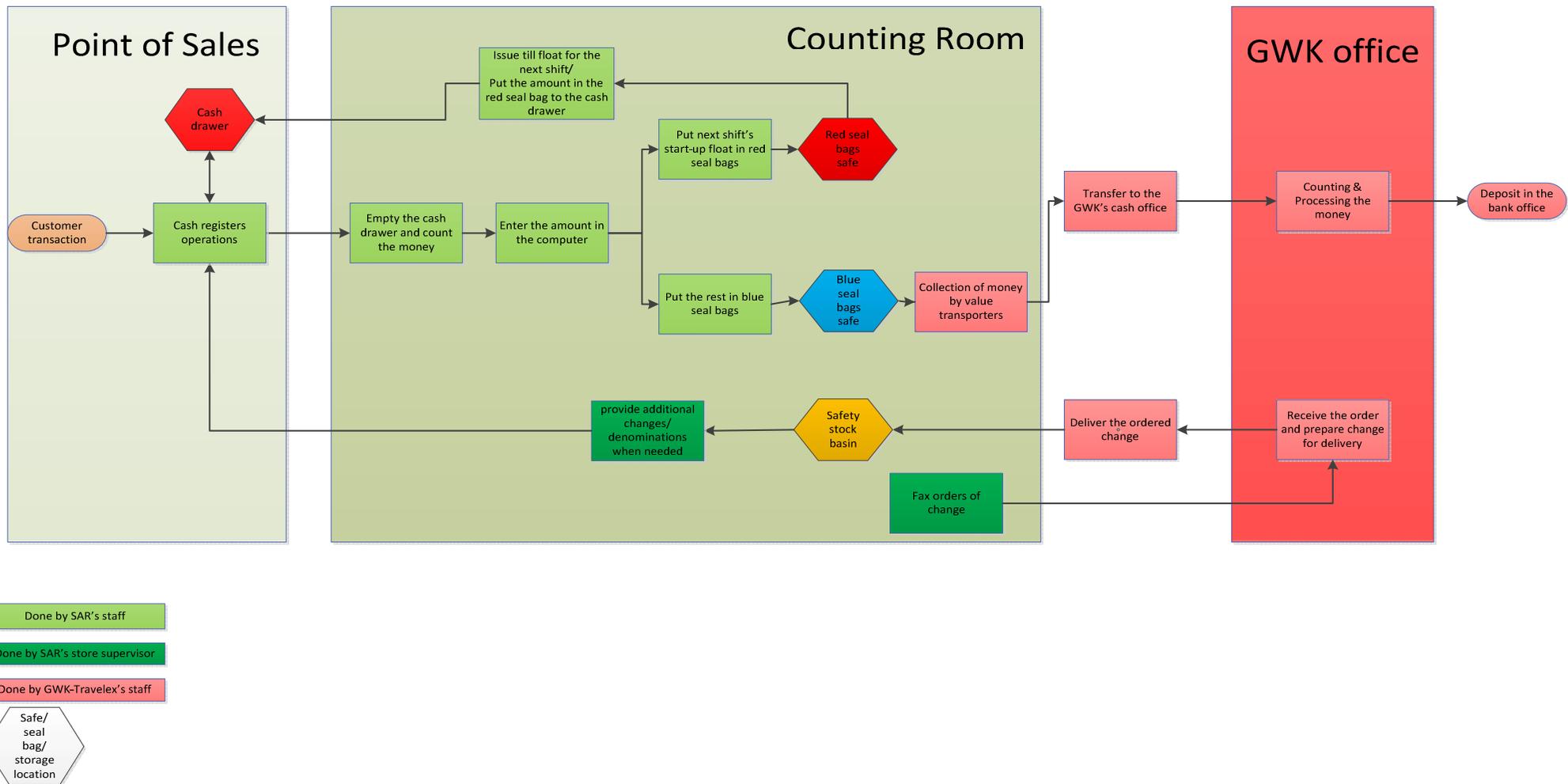


Figure 14: Current cash handling process at SAR

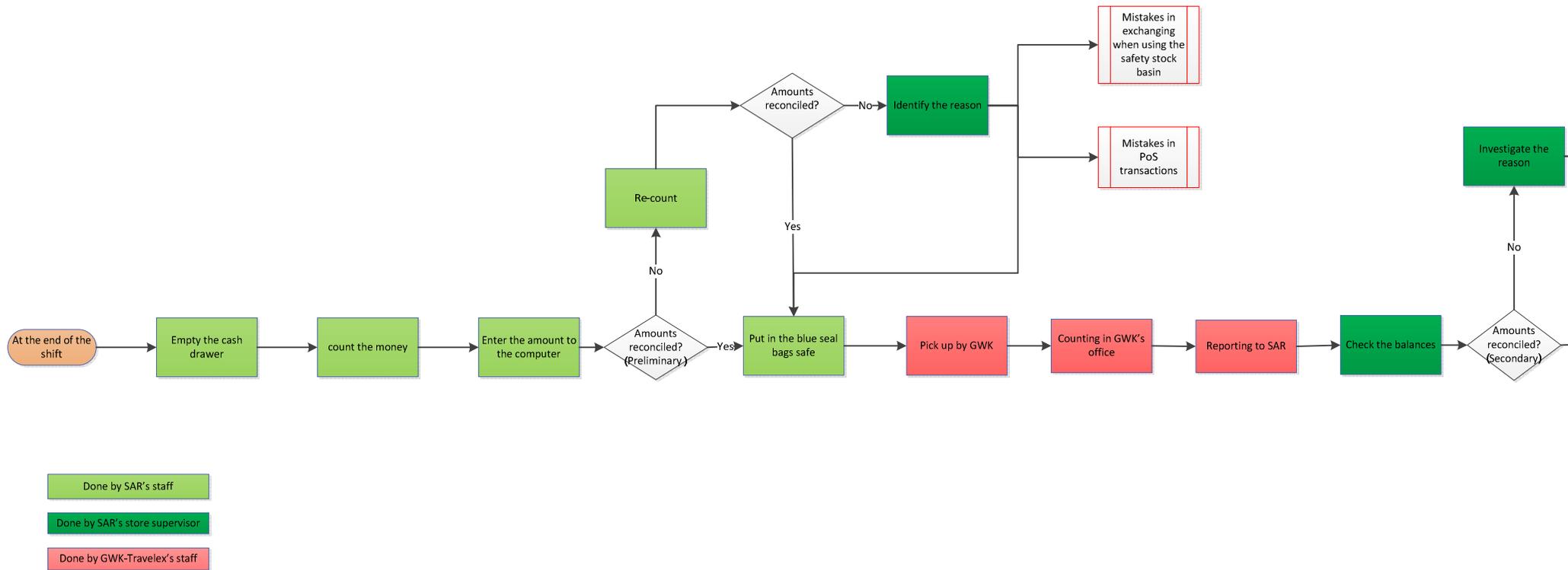


Figure 15: Control scheme for current cash handling process at SAR

Table 5 provides an overview of the current processes of cash handling at Kappe' and SAR.

Table 5: Overview of current processes of cash handling at Kappe' and SAR

	Kappe's Old system (Lounges 1 & 2)	Kappe's New system (Lounge 3 & 4)	SAR's system
Start-up float	€ 400 \$ 100	€ 250 \$ 50	400-500 (€+\$)
Coins for starting the shift provided by	Automatic Coin dispenser/ black bags	Automatic Coin dispenser	Red bags
Change currencies	€ , \$	€ , \$	€ , \$, £
Automatic Coin dispenser	Yes	Yes	No
Automatic Note dispenser	No	Yes	No
Safety stock basin (Notes and coins)	No	No	Yes
Balance checking	Manual- double time: check yours and the previous cashier's deposit (black box) at the end of the shift	Automatic- done by the note dispenser for each cashier at the end of their shift	Manual+ automatic- money counted and the starting amount is put in red sealed bags, the rest is put in blue sealed bags and dropped in the safe. Figures are entered in the computer for balance checks.
Depositing in the bank	Done individually by cashiers- about 60 sealed bags per day+ 3 additional visits for exchanges (30-60 min per visit)	Every 3-4 days (there's always more than enough in the note dispenser → safety stock)	Done daily by GWK- Travelex value transporter
Providing the needed denominations	Visiting the bank	Note dispenser	Safety stock basin
Accessibility/responsible person	Some cashiers	All cashiers	One person during each shift
Daily bank visits for exchange purposes	2-3	0	0 (almost never)
Frequency of coin orders	Every 3 weeks	When needed	Daily

Summation

This chapter described the cash handling processes at Kappe' and SAR. Generally, at retail stores, the cash handling process in each shift begins with an amount of start-up float placed in the till to be used as change in cash transactions. The amounts collected during the shift are then deposited in the retailer's bank account once counted and reconciled. Separation in start-up floats and deposits allows for individual responsibility of employees and more transparency in the cash handling process. Having explained the general scheme of cash handling at Kappe' and SAR in this chapter, chapter 4 will focus on using Activity-Based Costing for identifying the main sources of costs of these processes.

Chapter 4:

Sources of costs in current cash handling procedures at Kappe' and SAR

So far, a review of available literature on cash handling and its underlying cost items has provided a general understanding of the factors that can increase the costs of cash handling in the retail sector. Depending on the actual scheme of the process, these factors will have different shares in total costs of cash handling. Contractual agreements with Professional Cash handlers might be a large part of costs for one retail group. On the other hand, some retailers are more old-fashioned and delegate (part of) the counting and reconciliation activities to their employee which can be observed in larger share of employee costs in total costs of cash handling. While investments in technological solutions impose large upfront costs, they allow for decreasing the costs of other categories and can be redeemed in a few years. Nonetheless, the decision for adopting them should be made based on not only the current, but also the future popularity of cash as a payment instrument. In other words, the investment must be economically justifiable considering the future demand for cash in comparison with other forms of payment (e.g. credit card, debit card)

This chapter will focus on identification of the factors that are of significance in the total costs of cash handling. To this end, Activity Based Costing (ABC) will be used to systematically discover the causes of large costs of cash handling at Kappe' and SAR. The literature review discussed in chapter 2, provided a general insight to such causes, whereas ABC will allow for a detailed understanding of the problem at the organizations under study. By using ABC, different cost categories will be compared in terms of their share in total costs of cash handling. Such an approach will make it possible to modify the alternative solutions in such a way that the deficiencies of the system can be eliminated/reduced. Figure 16 shows the focus of chapter 4 as part of the research.

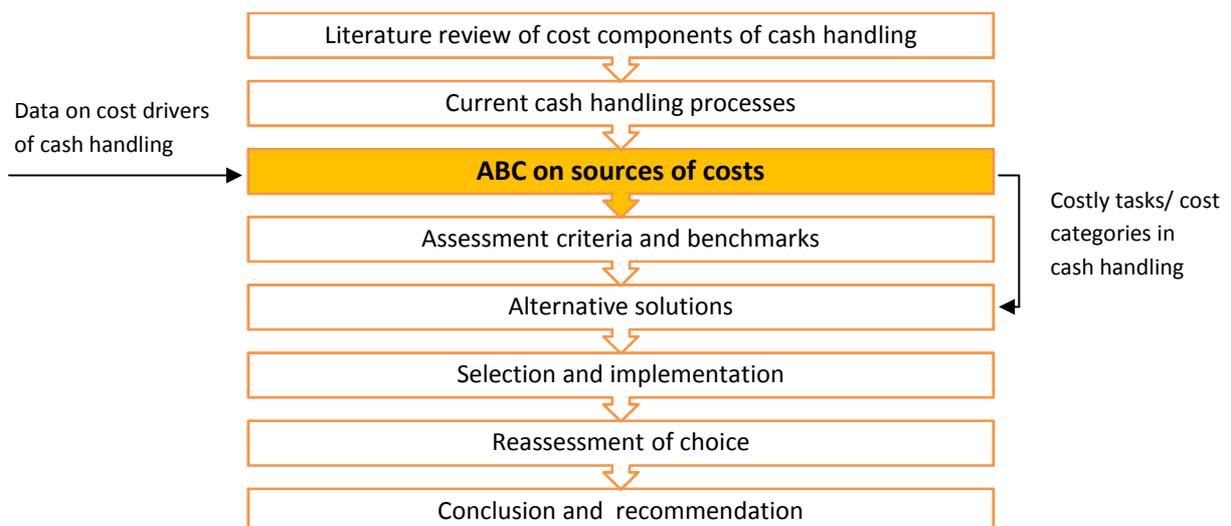


Figure 16: Focus of chapter 4

4.1. Activity-Based Costing

4.1.1. Definition

The concept of Activity-Based costing (ABC) was developed in the manufacturing sector in the United States during the 1970s and 1980s. It is a method used for specifying costs by dividing a project into discrete, quantifiable activities or a work unit. ABC is used to identify, describe, assign costs to, and report on operations and it is considered a more accurate system for cost management compared to traditional cost accounting methods.¹

In ABC the project is broken down to its constituent activities or work units that can be quantified. Then costs are assigned to each individual activity based on its use of resources. Thereby, cost of cost object is calculated based on its use of activities.¹

4.1.2. Applications of ABC: motivation for choice of methodology

Given its advantages over traditional accounting methods, ABC has been widely used in cost estimates. In calculations of costs of different payment instruments ABC has been considered a proper method by national banks in several countries (Norway, Portugal, Finland, Netherlands).

In Gosselin's 1997 article on implementation of ABC, it has been referred to as the third level of Activity Management (AM). AM is the effective and consistent organization of a Strategic Business Unit (SBU)'s activities in order to use its resources in the best possible way to achieve its objectives (Brimson, 1991). According to Cooper (1998), ABC enables management to measure product and service costs with more accuracy.²³

ABC has also been one of the key elements of the methodology used by ECB and MNB¹ to assess costs for central bank, credit institutions, cash-in-transit companies, and interbank infrastructure providers. In these cases, calculations for ABC were based on the time needed for activities.²⁴

Use has been made of ABC in Norwegian²⁵ and Portuguese²⁶ studies on the social costs of retail payment instruments_ at least where the banks' costs are concerned. In addition to POS payment instruments, these studies also consider direct debit and credit transfers. It proved to be a suitable concept for analysing relevant costs in payment systems. In this methodology, the cost of the activities along the payment chain has been allocated to the different payment products and services within a bank.⁷

Another case where ABC has been used is by the Portuguese central bank. It estimated the private cost of cash, direct debit, cheque and credit card and debit card transactions. The cost was estimated with the ABC method in the banking sector and with the collection of costs and work expenditures relating to payments in the case of merchants.²⁴ Correspondingly in the UK, ABC has also been considered as a suitable methodology for detailing activities of an organization and their respective costs and thereby providing more clarity to costs. Categorizing costs based on the way they are consumed, cost reduction possibilities can be investigated.²⁷

In Gresvik and Owre's 2003 study on "Costs and income in the Norwegian payment system", the results were derived using ABC. Analyses of data on Norwegian banks using Contribution Margin Analysis and ABC, have shown ABC method to deliver more accurate results. Allocation of costs to

¹ Magyar Nemzet Bank (Hungarian National Bank)

products/ services in ABC results in a more precise picture of the distribution of costs and a useful basis for strategic decisions.²⁸

In order to find out the cost structure of a Microfinance Institution (MFI)¹, the activities on which an MFI incurs costs, need to be identified. Similar to aforementioned bank reports, the methodology used, borrowed heavily from the Activity Based Costing templates of Consultative Group to Assist the Poor (CGAP). It involved desk work in terms of collection of data, its cleaning and then analysis. The field activities include holding consultations with the personnel of MFIs at various levels starting from the CEO to the operational staff.²⁹In this study of costs of cash handling for Kappe' and SAR, data has been provided in a similar manner and will be used in determining the cost-imposing activities. Thus, ABC is recognized as a proper methodology.

In calculating the total costs of cash handling at Kappe' and SAR, it is desirable to identify the cost of individual activities carried out in the cash handling process. For activities carried out by staff this will be done based on the amount of time spent on the activity and the corresponding costs. Other costs, including bank/ CiT costs, rent fees and technology costs will also be derived from a basis. The similarities between objectives of this study and aforementioned studies, are adequate support for application of ABC in assigning costs to different activities of Kappe' and SAR. If done properly, this can result in coherent figures.⁷

4.1.3. Stages of ABC

In using ABC, three terms need to be defined. These are:

- **Cost object:** An item for which measurement is required (e.g. a product, a service or a customer).
- **Cost pool:** Grouping of costs incurred on a particular activity which drives them.
- **Cost driver:** Any factor or force that causes a change in the costs of activity. Cost driver can be a resource cost driver or an activity cost driver. A resource cost driver is a measure of the quantity of the resources an activity consumes whereas an activity cost driver indicates the frequency and intensity of demand for an activity.

ABC consists of a number of steps. They are as follows.

❖ Identifying the cost objects

For the purpose of study of cash handling at Kappe' and SAR, the cost object is the "cash handling processes at Kappe' and SAR" for which total annual costs must be calculated. The total costs are the sum of annual employee costs, technology costs and fees paid to CiT Company/ bank.¹¹

❖ Identifying the different activities within the organization

Considering the current procedures of cash handling at Kappe' and SAR, the activities can be divided depending on the responsible party. Activities can be done by the retailer's employee, cash recycling machines (i.e. mechanically) and CiT Company/ bank. Therefore there are three main cost categories:

- Staff costs
- Technology costs

¹Basic function of MFIs is to deliver microfinance services to low-income clients.

¹¹ In case extra space is required for cash office, its rent must also be accounted for.

- CiT company/ bank costs

These cost categories include a number of tasks/ sub-categories for which costs are incurred. These tasks represent the cost pools in Activity-Based Costing.

❖ **Determining the activity cost driver**

Cost drivers depend on the activity and the liable party. For some employee activities the cost drivers are number of man hours and wage per man hour. The fees paid to external parties such as recycling machines' merchants, ABN-AMRO and GWK-Travelex are agreed upon through contracts and are dissimilar. For instance GWK-Travelex charges Kappe' based on the number of seal bags deposited, while ABN-AMRO charges SAR on the basis of total annual transactions of the company with the bank.

Table 6 includes the complete list of cost pools, activities and their corresponding cost drivers for the current cash handling systems at Kappe' and SAR.

Table 6: Activities in current cash handling procedures at Kappe' and SAR

Responsible party	Cost pool	Cost driver(s)	Activities included		
			Kappe' old	Kappe' new	SAR
Employee	start of the shift Travelling a distance (if required) and preparing start-up float	man hours spent € per man hour	<ul style="list-style-type: none"> taking a seal bag from the safe in the back office counting the amount reconciling with the number recorded by the previous employee putting the money in the till 	<ul style="list-style-type: none"> travelling to P&C west (if needed) withdrawing till float from the machines with personnel ID going to the store 	<ul style="list-style-type: none"> taking personal red seal bag from the safe and putting in the till
	end of the shift Counting the value of the till and registering the value in the back office system OR Travelling a distance (if required) and depositing transactions value	man hours spent € per man hour	<ul style="list-style-type: none"> taking the money to the back office counting, keeping enough as next shift's float entering amounts to the computer to reconcile taking the rest of the money to ABN on their way home 	<ul style="list-style-type: none"> depositing the money in machines and reconciling with personnel ID travelling to P&C West to deposit the collected amounts in the machine depositing the seal bag in the machine in bank deposit machine 	<ul style="list-style-type: none"> counting the collected amount putting sufficient float for next shift in the red seal bag putting the rest in the blue seal bag entering amounts in the computer to reconcile
	During the shift Travelling a distance (if required) and changing banknotes at the desk of	man hours spent € per man hour	<ul style="list-style-type: none"> collecting orders from colleagues visiting the bank and getting the needed amounts 	N/A (visiting P&C West if needed)	<ul style="list-style-type: none"> asking the shift supervisor for the needed change/ denominations/ currencies

	Administration and control activities	man hours spent € per man hour	<ul style="list-style-type: none"> reconciling each cash counting of sales employee ordering and handling coins monitoring and investigating differences in cash controlling value of deposited seal bags at bank account 	<ul style="list-style-type: none"> controlling coin machines and cash machine ordering and handling coins monitoring and investigating differences in cash procedures controlling value of deposited seal bags at bank account 	<ul style="list-style-type: none"> managing cashier employee doing research on discrepancies financial administration: maintaining safety stock and placing coin orders
ABN-AMRO/GWK-Travelex	Euro seal bags	number of seal bags	<ul style="list-style-type: none"> depositing Euro and Foreign seal bags in the bank by employees minus compensation by bank 	<ul style="list-style-type: none"> depositing large Euro and Foreign seal bags in the bank by employees minus compensation by bank 	N/A (pay basis is different)
	Foreign seal bags	number of seal bags			
	Compensation for foreign seal bags	% of value of foreign seal bags			
	Total amount deposited	% of total transactions value	N/A (pay basis is different)	N/A (pay basis is different)	<ul style="list-style-type: none"> Value Transport and temp storage recounting deposits / deposit on account management on banking process charging based on amount of total annual deposits value in Euro
Technology (Recycling machines)	Acquisition	€ per year	<ul style="list-style-type: none"> purchasing coin and note machines (hardware and software) performing regular maintenance 	N/A (The corresponding costs are excluded since they were incurred years ago and have since been recovered)	N/A (The corresponding costs are excluded since they were incurred years ago and have since been recovered)
	Maintenance	€ per year			

❖ Relating the overhead and support activities to primary activities

Normally in Activity-Based Costing support activities (i.e. activities which provide support, assistance or administration to other activities) are spread across other activities. This indicates which primary activities require support and to what extent.¹ Nevertheless, for the purpose of our study it is considered more insightful to keep some of the support activities as separate fields. The reasons for this approach are the following:

- Administrative tasks are part of the employee activities. Regardless of the type of system they are required to some extent. The difference may only be in the activities. For the case of this study, this difference is irrelevant. It is merely the total administration time that is of interest since administrative employees are paid more than the others. Therefore, the administrative costs will **not** be spread over cost pools. They will instead be calculated separately and included in the staff cost category. This approach has a number of advantages for the purpose of this study.
 1. Wages of administrative employees are normally higher than normal employees. A separate calculation of administration costs would allow for more clarity and ease in case a change in wages is to happen.
 2. It will be more clear who is in charge in the three-fold responsibility matrix of staff, technology, and CiT company/bank.
 3. Administration costs in the solution scenarios will also be calculated separately. Thus, it will be possible to compare current and future situations in terms of administration required.
- Installing cash machines at the stores influences the employee cash handling time (and costs) as well as the reliance on CiT companies. It is only the total technology costs that Kappe' and SAR are interested in, not the reasons for changes in technology costs. In addition, there are no constraints with regards to amounts of investments or possibilities of changes in the current systems. Furthermore, having a separate cost category for technology will assist in comparing different solution scenarios with each other as well as the current situation. Therefore, technology will be a separate cost category in Activity-Based Costing.
- Financial institutes and CiT companies differ in their terms of contract. For instance in the current systems, ABN-AMRO charges Kappe' per seal bag while GWK-Travelex charges SAR based on the total annual amount deposited. The suitable contract depends on a company's strategy, transactions and cash handling processes. Having a separate cost category for costs paid to financial institutes makes it possible to compare solution scenarios considering their appropriateness for each retailer.

❖ Identifying the direct costs of products

Costs of different cost pools are listed in this step and then added up to show the total costs. Since the total number and value of transactions differ among the systems under study, calculating cost per transaction and cost per Euro of transaction can provide a common basis for comparison. The share of each cost pool (and cost category) in total costs, helps in comparing different systems with regards to the main source of costs in them. Having said these, the following calculations are done for each system.

Cost = Cost driver * unit costs

$$\text{Cost per transaction} = \frac{\text{Cost}}{\text{Number of cash transactions}}$$

$$\text{Cost per Euro of transaction} = \frac{\text{Cost}}{\text{Value of cash transactions}}$$

$$\text{Share in total costs} = \frac{\text{Cost}}{\text{Total costs}}$$

In the following, the steps of ABC are done for cash handling processes at Kappe' and SAR in 2012. Considering some expected changes, the cost pools might be different in 2013. ABC of 2013 will therefore also be done. After that, the effect of changes on the cost pools will be analyzed by comparing 2012 figures with those of 2013. It should be noted that if no alternative procedures are adopted by Kappe' and SAR, the current systems will reside. Consequently, the costs will resemble the calculations for 2013.

4.1.4. ABC for Kappe'

Not disclosed in this document

4.1.5. ABC for current system of SAR

Staff costs

Tables 22 and 23 include the basic information and calculations for the cash handling process at SAR.

Table 7: Data on wages and working hours at SAR

Field	Amount
Average wage (€ per hour)	32
FTE (hour per year)	1,664
FTE salary (thousand € per year)	53

Table 8: Data on time spent on cash handling by employees at SAR

Activity	Average frequency per day	Average time (min)	FTE equivalent	Annual time ⁱ (hour per year)	Annual cost ⁱⁱ (€ per year)
Start of the shift: preparing till with start-up float	42	3	0.46	767	24,544
During the shift: changing currencies / cash denominations	1.03	5	0.02	31	992
End of the shift: composing turnover deposit and cash advance	42	20	3.07	5,110	163,520
Administration: maintaining bulk cash advance / check of content	2	15	0.11	183	5,856
Administration: research on discrepancies	1	60	0.13	209	6,688
Financial administration	3.4	-	0.53	886	28,352

GWK-Travelex fees

Table 24 summarizes SAR's agreement with GWK-Travelex for the outsourced tasks.

Table 9: SAR's contract with GWK-Travelex

Services provided by GWK-Travelex	Average frequency of visits (times per day)	Payment basis
Value Transport and temporary storage, Recounting deposits / transferring deposits to bank account, management on banking process, delivery of change	1	1% of value of annual transactions ⁱⁱⁱ

Total costs

Table 25 shows the costs of main categories for cash handling at SAR in 2013 (the same as 2012^{iv}). It also helps compare different cost categories in terms of their significance in total costs of cash handling at SAR.

ⁱ FTE*1664 hour per year per FTE

ⁱⁱ FTE* € 32 per hour per FTE

ⁱⁱⁱ Annual transactions amount to about €92 million.

^{iv} The revenues are expected to fall by a small amount in 2013. However, since no data is available, no particular distinction can be made between costs in 2012 and 2013.

Table 10: ABC for SAR in 2012 or 2013

Cost category	Cost (€)	cost per transaction (€)	cost per Euro of transaction (€)	Share in total costs
Staffs' cash handling tasks	229,952	0.13	0.0057	71%
GWK-Travelex fees	92,000	0.05	0.0023	29%
Technology costs	0	0	0	0%
Total costs	321,952	0.18	0.0080	100%

It can be observed that staff costs of cash handling have a much larger share in total costs compared to fees paid to GWK. Since there is no use of cash recycling or counting machines, the cost of this category is 0. The total costs will be around €322 K and handling of each transaction will cost around €0.18.

4.2. Analysis of sources of costs

4.2.1. Sources of cost in Kappe's old system

In 2013, over 8500 hours of the staffs' working time will be spent on cash handling activities delegated to them. In other words, over €205k of wages paid will be due to cash handling activities and not core tasks namely sales and customer service. On the whole, large reliance on employee results in a share of 67% for employee costs in total costs of cash handling to be incurred by Kappe' in 2013. Of this share, 50% will correspond to cash handling activities carried out at the end of each individual's shift. Taking the tills to the back office, counting the money, preparing next shift's start-up float, and reconciling the transactions are all part of end of shift activities. The second largest share in total costs of cash handling belongs to administration and control activities with a 17% share in total costs. In Kappe's old system, the store managers and supervisors are highly involved in checking (and in cases double checking) activities of employees at different times. For instance when additional floats (smaller denominations and other currencies) are needed during the shift, the store manager needs to approve of and check the amounts before and after a bank visit is done by one of the employees. In addition, he/ she is responsible for randomly checking the start-up floats left in the seal bags with the amounts recorded by employees for any possibilities of cash shrinkage. Checking sufficiency of coin supply in the coin dispensing machine and reconciliation of total amounts are other tasks for which the store managers are held responsible.

As explained previously, a new contract with ABN-AMRO from April 1st 2013 will increase the total fees paid to the bank in the year ahead. The number of seal bags in 2013 has been estimated based on the expected growth in transactions. Kappe' will have to pay over €100 to ABN-AMRO in 2013 which would be reduced to around €32k after a 2% compensation for foreign currencies. This will be 33% (before compensation) of the costs of cash handling in Kappe's old system in 2013.

The share of employee tasks in total costs leads to €0.45 per transaction (after compensation). Fees paid to ABN-AMRO are the reason behind €0.07 of costs per transaction (€0.22 before compensation). Technology costs would have a share of 3% in the total costs. In total, the old system used by 7 stores of Kappe' will impose a cost of €245k on the retailer in 2013 (i.e. €0.53 per transaction) after compensation. Chart 1 shows the sources of costs in Kappe's old system.

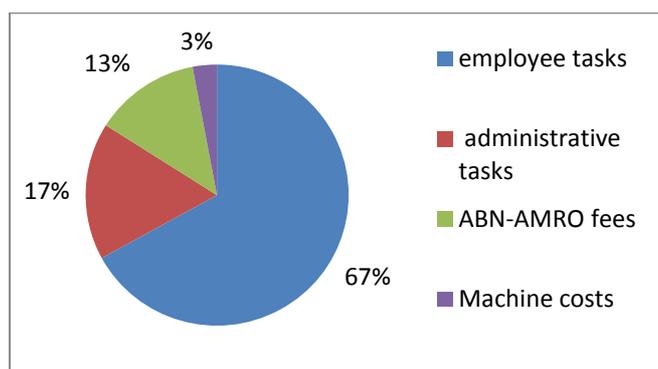


Chart 1: Distribution of costs for Kappe's old system (after compensation)

4.2.2. Sources of cost in Kappe's new system

If no improvements are made in the system used in 2012, this system will continue to be utilized in 2013 and will impose costs as included in Table 20 (Kappe' new 2013). A plausible solution will be one that enhances the efficiency of Kappe' new in 2013 (**not** Kappe' new in 2012). Therefore, different cost categories in the solutions, should be compared in terms of cost, cost per transaction, cost per value of transaction and share in total costs in 2013.

It is expected that in 2013, over 3000 hours will be spent on cash handling activities by the employees at the stores run using the new system. This means that over €80k paid by Kappe' to its store employees are for their cash handling tasks (77% of total costs of cash handling before compensation). This is composed of almost equal share of administrative and non-administrative tasks (38% and 39%, respectively). This is the direct result of the nature of the system which is highly reliant on cash recycling and largely automated. The employees no longer need to count their start-up floats and collected amounts. Individual bank visits for depositing seal bags is not required either. On the other hand, supervisors' tasks are focused more on controlling the cash safety stock levels in the machine and depositing the seal bags at the near-by bank deposit machine at appropriate intervals.

The anticipated rise in transactions of Kappe' in 2013, will slightly increase the number of seal bags at the new stores as well. The total fees to ABN-AMRO in 2013, will amount to about €7k before compensation. This is equivalent to a 16% share in total cash handling costs in 2013 or €0.03 per transaction. The 2% compensation to be paid by ABN-AMRO will reduce the costs further by around €35k.

In terms of technology costs, about €16k will be the amount incurred in 2013 (up-front investment is distributed over the depreciation period). This is in line with €0.06 per transaction. On the whole in 2013, around €70k will be spent on cash handling in the new stores (after compensation by the bank). This corresponds to €0.28 per transaction considering the compensation. Chart 2 shows the sources of costs in Kappe's new system.

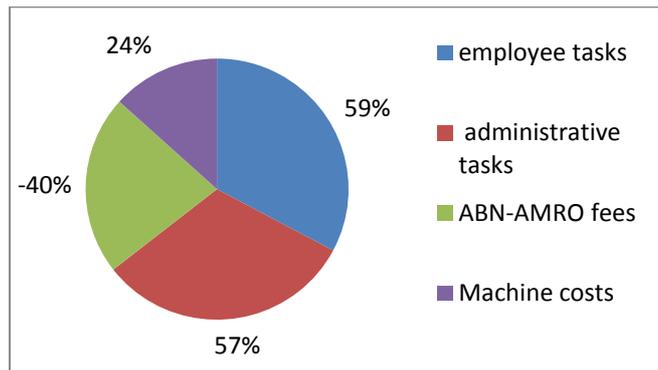


Chart 2: Distribution of costs for Kappe' new system (after compensation)

4.2.3. Sources of cost in SAR's current system

As the calculations show, in 2013 about 7200 hours will be spent by employee on cash handling activities. This will amount to around €229k of wages to be paid and a share of 71% in total costs of cash handling. Over 2/3 of this will be originated from end of shift activities carried out by employee. These include counting the collected amounts, preparing one's start-up float for the next shift to be stored in red seal bag, storing the rest of the money in blue seal bags, and reconciling the transactions with software¹. The administrative employee are responsible for controlling transactions and amounts reconciled by employees, maintaining the required level of safety stock and issuing change orders, and checking the reports received from GWK on deposited seal bags. All of these are reflected in the 13% estimate for share in total costs. Availability of a safety stock cuts on lengthy change interventions and thereby reduces costs of such errands (note the small 0.31% share in total costs for during the shift activities).

€92k will be paid to GWK based on the amount of transactions. This will account for the other 29% of the total costs of cash handling which is equivalent to €0.05 per transaction. In total, SAR will be undergoing €322k for cash handling purposes. Given the number of transactions, each transaction will cost €0.18. Chart 3 shows the sources of costs in SAR's current system.

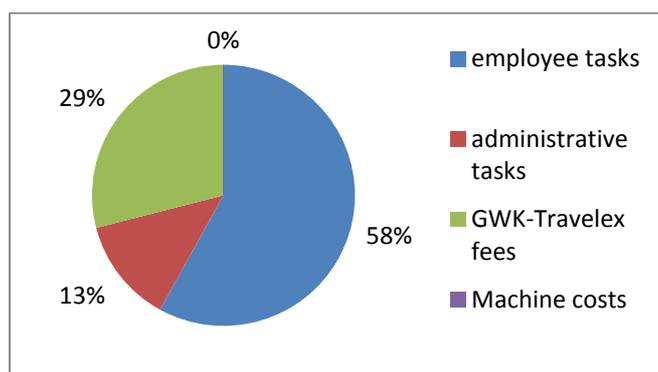


Chart 3: Distribution of costs for SAR

¹ Similar to Kappe's old system, the software costs for SAR are left out of the estimations since they were incurred before 2012.

4.2.4. Comparison of current systems at Kappe' and SAR

Not disclosed in this document

4.3. Sensitivity analysis

Data used in this study has been provided from different sources with different degrees of accuracy. In addition since the systems under analysis are dissimilar in terms of tasks involved, there is a natural dissimilarity in the data on cost drivers relating to cash handling tasks carried out by employees. The used data is an average and no estimations of actual accuracy could be provided by those who have supplied the raw figures. Therefore, a sensitivity analysis is using the following primary definitions:

- ❖ Cost drivers: unit time spent on cash handling tasks¹
- ❖ Initial amount: the estimates provided by Kappe' for the variables
- ❖ Change in cost driver: up to $\pm 25\%$ of the variable

Sensitivity analysis shows how variant the total costs are with different levels of change in initial amounts of cost drivers. Below the results of sensitivity analysis for current systems of Kappe' and SAR are presented.

As chart 4 shows, in Kappe's current system, from different factors in the old system unit time for end of shift activities in lounges 1 and 2 can cause the largest variation in total costs. This originates mainly from the issue of using the back office also for non-cash handling purposes and the potential distractions for employees. On the other hand, in the new system time for administration causes the largest change in total costs. This can be attributed to significant role of administration in an automated process.

¹ In charts for Sensitivity analysis these cost drivers are referred to as start of shift, end of shift, during the shift, distance to the bank, and distance to the machines. These are in correspondence with the activities explained at length in Table 6. *All factors* refers to equal simultaneous changes in all the cost drivers for the system/ alternative.

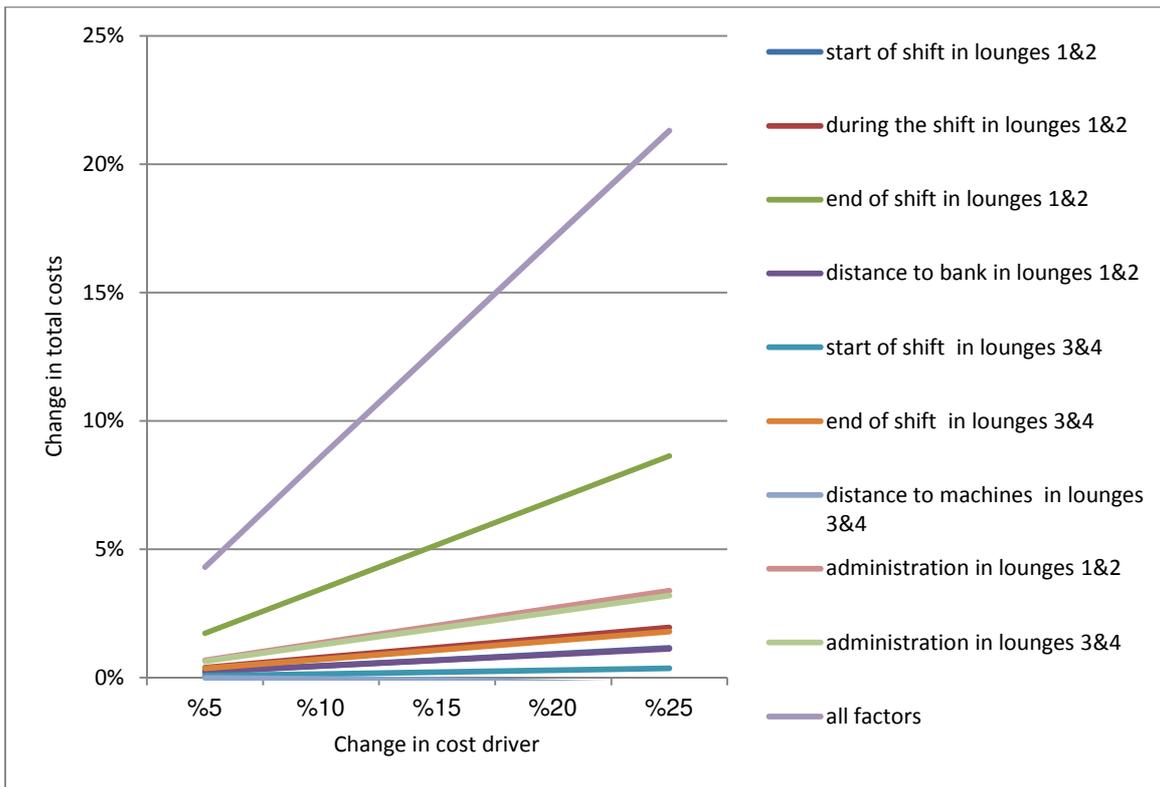


Chart 4: Sensitivity analysis for Kappe's current system

As chart 5 shows in SAR's current system, similar to Kappe's old system, costs are the most variant if the unit time for end of shift activities change. Since there is automation in counting money and the back office is not used particularly for this purpose, this activity is likely to be highly variable.

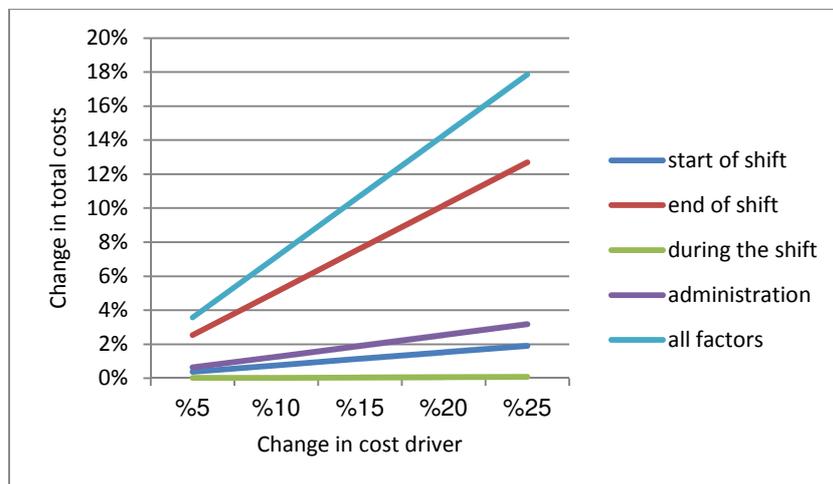


Chart 5: Sensitivity analysis for SAR's current system

As explained above, at both Kappe' and SAR, lack of automation takes its toll. This can be observed in large sensitivity of total costs to end of shift activities of employees.

Summation

In this chapter, Activity –Based Costing was used to find the sources of costs in the cash handling processes currently used at Kappe' and SAR. The main cost pools have been found to be staff wages, machine costs, and bank/ CiT company fees. Then, the comparison between systems showed that automation can reduce the costs of cash handling as in Kappe's new system. Finally, a sensitivity analysis was done for each system to identify the cost drivers which can cause large variation in total costs of cash handling. It was observed that in Kappe's old system and SAR's system, end of shift activities can cause the largest variation in total costs. This is due mainly to the issue of using the back office also for non-cash handling purposes In Kappe's new system, time for administration leads to the largest change in total costs. This can be attributed to significant role of administration in an automated process.

Before substitute cash handling processes are proposed, success criteria will be studied in chapter 5.

Chapter 5:

Assessment criteria, and benchmarks

A number of factors can influence the choice of solutions for handling cash by retailers. Among these are type of products, amount, and number of transactions, location of stores, and even some uncontrollable elements such as trends in payment methods and services offered by third parties (i.e. banks and CiT companies). These factors were studied in detail in chapter 1 in general and in chapter 3 for the special case of Kappe' and SAR.

Selection of solutions for cash handling process can be a daunting task given the numerous technological solutions and CiT services. Employees can be involved to varying degrees in the process. Each of these may have both advantages and disadvantages. It is therefore crucial to select suitable measures to compare the solutions with each other as well as the current situation.

The differences among retailers in terms of determinants of costs of cash handling result in different views on appropriate cash handling solutions. By determining the requirements of the problem owner, different solutions can be compared on criteria of interest. This helps retailers have a clear picture of the pros and cons of each solution and weigh them against each other. Interests of customers and preferences of employees are among the other factors that can influence retailers' choice. These views should be projected in the criteria for assessment of solutions.

There are also some external factors in selection of a solution (e.g. seasonal changes of demand, variations in customers' choice of payment instrument, and type of business). The impact of these factors is excluded from this study. Assessment criteria will nonetheless, provide sufficient insight into the expected impact of such factors. With this prospect, retailers can modify their choices at a later point in time in case some unpredicted changes arise.

Figure 17 shows the focus of chapter 5 as part of the research.

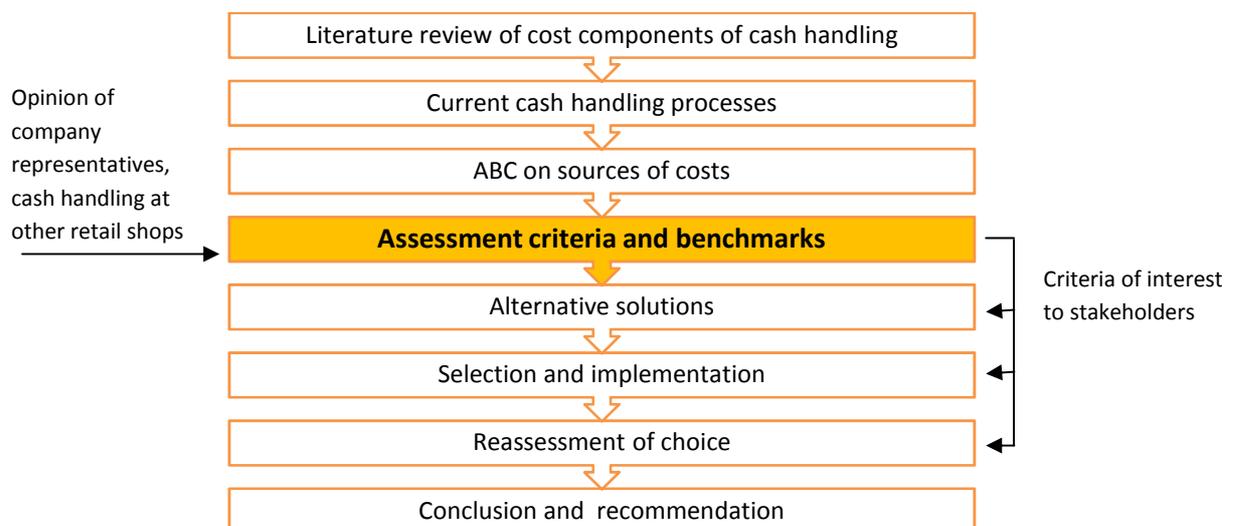


Figure 17: Focus of chapter 5

5.1. Stakeholder analysis

Given the significance of varying views in developing and then evaluating alternative cash handling procedures, a stakeholder analysis is deemed necessary. There are several stakeholders in the cash handling process including Kappe' and SAR, their employees, Schiphol Group, Amsterdam Airport Schiphol, banks, CiT companies and customers. These stakeholders may have both common and diverging interests which have been discussed with representatives of Kappe' and SAR and projected in Table 28.

Table 11: Stakeholders analysis-summarized

Stakeholder	Interest	Criticality	Involvement
Kappe' & SAR management	<ul style="list-style-type: none"> • reduce the total costs of cash handling • reduce the amount of time spent by staff on non-core activities • reduce the risks involved in the process • improve performance • work with other retailers to benefit from economies of scale 	****	pay attention t the stakeholder, harness their support and maintain it
Employees	<ul style="list-style-type: none"> • spend less time on non-core activities • undergo minimum amount of training • have safe working conditions 	*	keep informed and maintain their support
Customers	<ul style="list-style-type: none"> • reduced waiting time • safe purchases • acceptability of different payment instruments and currencies 	*	no action-keep informed if needed
Other retailers	<ul style="list-style-type: none"> • get better contract terms by cooperating with Kappe' and SAR 	**	raise awareness about the potential contributions of the project and seek positive input
Bank/ CiT company	<ul style="list-style-type: none"> • maximize profit • have fewer unplanned services • reduce frequency of change delivery and cash pick-ups • enhance the security of the process 	N/A	keep informed of desired changes-motivate to contribute to the project
Schiphol Group	<ul style="list-style-type: none"> • maximize profit • meet customers' requirements • ensure a safe work environment 	****	pay attention t the stakeholder, harness their support and maintain it

Table 28 shows that attention to Kappe' and SAR's interests is of top priority (high criticality). The same is true for Schiphol group. This is in compliance with the objective of this study which is to enhance the efficiency of cash handling for Kappe' and SAR. Other retailers seek a possibility of cost reduction which might also be of assistance to Kappe' and SAR. Thus, they are fairly critical. Customers and employees should be accounted for as well in finding ways to improve the current processes. However, their main interests will be addressed through those of Kappe' and SAR.

Therefore, their criticality is lower than the companies themselves. The complete table for stakeholder analysis can be found in Appendix 2.

In the next section, with attention for interests, attitudes, and power positions of stakeholders assessment criteria will be specified. The most prominent ones will be chosen as success criteria, to be used also in multi-criteria analysis later in the report.

5.2. Assessment criteria

Stakeholder analysis helps decide how much attention should be given to the interests of the different groups involved, especially the most critical ones. Given the nature of this research, the focus is on enhancing the efficiency of cash handling procedures mostly from the perspective of Kappe' and SAR (the retailers) and Schiphol Group. In addition, (frequency and amount of) waiting time for customers should be reduced. ⁱThus, performance also needs to be assessed in terms of customer service. Moreover, employees should be able to focus on their core activities and spend less time on cash handling tasks. These main criteria are explained below.

5.2.1. Criteria from the perspective of Kappe' and SAR

Costs

The main cost categories for solutions are those described in previous chapter in Activity-Based Costing.

❖ Costs of employees and administration

In many shops employees are involved (to some extent) in preparing start-up floats, sorting, counting, validating, investigating cash differences and even taking the cash to the bank. As a result, a large part of the wages, are paid for carrying out cash handling tasks rather than core tasks (i.e. sales and customer service).

❖ Fees paid to CiT Company/ bank

Retailers rely on third parties for supply of change, insuring cash against possible threats, making deposits and occasionally transporting values. These parties offer different services with varying payment schemes. Bank deposit fees are among the important factors that drive decisions about the way cash is handled. To this CiT charges might be added for taking cash deposits into their regional cash centres. The general policy is to charge more for small volume of cash. ⁱⁱ The objective behind it is to discourage retailers from depositing cash into local branches because handling cash in these branches is more costly compared to regional cash centres. Depositing via CiT services is a motivating procedure for many retailers. Bank fees are subject to rises; the direct result of which is the boost in costs incurred by retailers. ³⁰ Given Kappe' and SAR's interest in low-cost cash handling processes, it is crucial to include costs in the assessment criteria.

❖ Acquisition and maintenance costs of machines and technologies

ⁱ Customers might be kept waiting if denominations or foreign currencies are not sufficiently available.

ⁱⁱ See terms of contract for ABN-AMRO in previous chapters

Using technological solutions has a number of positive implications. It can bring about reductions in cash handling time, risk of robbery and cash shrinkage, and perhaps even fees paid to third parties. Despite the large up-front investment, such costs can be recovered after a number of years. As a result, costs of purchasing machines for recycling, dispensing, depositing, and counting cash should be taken into account.³⁰

Risks

It is important to provide a risk assessment for each solution. Security of cash cycle depends on a number of factors namely place of work, tasks, scope of responsibilities, and security of cash cycle. The proximity of parking area for CVIT van to the place of collection/delivery is also of importance. By defining the likelihood (probability) and impact (harm/ seriousness) of risks, they can be rated. The ratings assist in comparing different cash handling processes to see whether control measures are sufficient or more should be done to prevent harm.³¹ Risks can be divided to two main categories based on their sources: internal and external.

❖ Internal risks

- **Embezzlement**³²: Risk of theft or loss is among the major disadvantages of employees' contact with cash.³³ In different cash handling procedures, there is a possibility of theft or chance of mistake in counting or keeping records by employees. By comparing solutions, procedures that adequately eliminate the shortcomings of current systems can be identified.
- **Mistake**³⁴: Mistakes in counting or recording amounts are inevitable especially when there is little use of technology for such task and the cash cycle is not completely closed.

❖ External risks

- **Robbery**: Lack of a secure and efficient cash handling environment will lead to high risk of robbery. This problem becomes more prominent when employees are personally responsible for transport of cash in long distances. Although airport is a rather secure place, risk of robbery still exists. It is thus necessary to compare solutions with regards to their risks.³²
- **Technical issues**: It is important to perform regular maintenance on cash recycling machines to prevent unexpected breakdowns which could disrupt the cash handling process. Therefore, agreements should be made with the supplier of cash recycling machines for required services.
- **Delayed services by CiT Company**: Coin deliveries and cash pick-ups might be faced with unpredictable problems. Delays are unlikely, yet possible in this regard.

Other process indicators³⁵

Apart from risks, there are other process indicators that retailers might consider important. These are:

- ❖ **Start-up float**: Depending on the cash handling procedure and ease of access to additional float, the amounts of start-up float vary. While having more start-up float reduces the need for exchange during the shift, it may increase the risk of robbery. Another implication of more start-up floats is larger volume of cash holdings at the stores and the concomitant interest losses.

- ❖ **Interventions:** The amounts of start-up float differ across cash handling procedures. In addition, safety stock is maintained in some and not the others. Thus, during the working shifts there vary in terms of need to additional floats (i.e. exchanges for other currencies or smaller denominations of bank notes). Interventions are also possible for emptying full cash boxes (i.e. during cash pick-ups by CiT company or while skimming seal bags from recycling machines). When recycling or dispensing machines are used, the interval between interventions is referred to as machine up-time.³⁵
- ❖ **Interest losses from un-invested cash, cash holding, and cash in transition:** There is a cost associated with holding liquid assets and this is highest for cash. For a fixed amount this opportunity cost increases with interest rate. Depending on the amount of cash in transition retailers undergo an opportunity cost of lost interest.³⁶ Start-up floats and safety stocks maintained at shops are needed for daily transactions. On the other hand these are the amounts for holding which retailers undergo a loss of interest. Accordingly, holding excess amounts of them is undesirable. Other amounts (namely amounts prepared for deposit or pick-up by CiT company) if withheld for long periods have similar connotations to an even larger extent. Having said this, despite the differences in frequency¹ the collected amounts are deposited at appropriate intervals to avoid great interest losses. Frequency of making deposits is of significance.
- ❖ **Transparency of the procedure:** One of the indicators of a proper cash handling procedure for Kappe' and SAR is its transparency. In a transparent process³¹
 - mistakes in counting are eliminated/ minimized;
 - mistakes in recording sales and transactions data can be easily identified;
 - exact amounts in different places in the cash chain can be determined;
 - online monitoring and streamlining of transactions is possible; and
 - it is known which employees are accountable for each task.
- ❖ **Homogeneity of procedures in different shops:** Using similar procedures in all shops allows for rotation of employees with no need for additional learning. It will also contribute to the transparency of the process and ease of supervision.

5.2.2. Employee requirements

Some of the properties of a suitable cash handling procedure from the perspective of employees are:

- ❖ **Need for training:** The employer is responsible for training of its employees so that they can carry out their cash handling tasks effectively. As a result, it is in the employer's interest to compare the need for training in different solutions.³¹ Learning for employees varies with the homogeneity of cash handling systems at different shops and the extent of change compared to current systems.
- ❖ **Scope of responsibility:** It should be clear who is in charge of recording of charges/billing, collecting cash and depositing it, reconciliation, and administration. Clear task delegations are among the factors that can enhance the transparency of the procedure and solutions should be

¹ Note that at Kappe' old system this is done at the end of each shift by individual personnel, whereas at the new system, the cash recycling machine is skimmed two to three times each week. At SAR, blue seal bags are picked up by GWK's value transporter on a daily basis.

comparable in this regard.^{31 37} A narrow scope of responsibility allows employees to focus on and excel in the core tasks with which they are entrusted.

- ❖ **Extent of wrongful accusations and finger pointing**³⁸: A transparent cash handling cycle with clear responsibilities reduces insinuations. Ease of identification of transgressors adds to the appeal of a cash handling procedure not only in the eyes of the retailer, but also its employees.
- ❖ **Working conditions' hazards**³²: It is among employers' responsibilities to provide a safe place and systems of work for their employees. Tasks delegated to employees must comply with safety requirements. One of the factors that can distinguish cash handling procedures from each other is how much risks the employees are exposed to while carrying out their tasks.

Generally, employees prefer minimal learning for tasks and a narrow scope of responsibility. They favour processes which are free of wrongful insinuations and involve little risks in carrying out tasks.

5.2.3. Customer requirements

Retailers need to support customers' desire not only for speed and convenience but also for more access and control over their cash.¹⁸ A smooth cash handling procedure allows employees to focus on their core tasks and provide better services to customers. In such a procedure there will be no/little need for interventions in transactions to provide change. Moreover, it will guarantee a safe purchase environment for the customers. Different performance indicators can be used to assess a retailer's performance with regards to customer service. Some of these customer-centric KPIs are:

- Customer GROSS Profit = Customer Sales - Customer Cost of Goods Sold for a period
- Customer Lifetime Purchase Value - Monetary value of each customer's life time purchases from the retailer
- Customer Profitability = Customer Sales - (Customer Returns - Customer Cost of Goods Sold + Customer Promotion Expenses + Activity-Based Cost of Servicing Customer) for a period
- Customer Purchase Freq Count - Count of customer purchases transactions over a period of time
- Customer Purchase Value - Monetary value of each customer purchase during a period with an average value for all purchases for the period
- Customer Reference question - A rating from 0 to 10 that indicates if the customer would recommend the store.
- Customer Sales by Segment - This formula is dependent upon defining customer segments (based on age, education, lifestyle, income and other factors) and associating individual customers to specific segments.
- Customer Service staffing = Face to face customer service employees count / total employees count
- Visit to Buy Ratio = Sales Transaction Count per period / Visit Count Per Period³⁹

In the stakeholder analysis customers have been considered as "acquaintances" (low power, low interest and positive attitude). Nonetheless, it is important for decision makers to serve their customers efficiently and effectively.⁴⁰

Given the nature of this report it is not desirable to expend large attention on some of the KPIs listed above. It is believed that the following will provide the desired level of insight:

- ❖ **Point of Sale waiting time:** Customers demand fast services before, during and (in case of refunds) after payments. This requires proper customer service staffing which implicates that employees should be involved mostly with sales-related activities rather than cash handling tasks.⁴¹ Accordingly, it is important to find how much time each employee spends on carrying out cash handling tasks during his working shift. The remaining time can be dedicated to the core task of customer service. In this study, it is referred to as **availability rate for customer service**¹. It should be noted that supervisors are liable for administrative activities, not the sales employees. Therefore, the amount of time spent on administration is excluded in estimating the availability rate for customer service.
- ❖ **Reversibility of transactions:** Till floats should be sufficiently maintained so that customers can be provided a refund on their cash purchases upon request.
- ❖ **Acceptability of different payment instruments as well as different currencies in cash payments:** As mentioned earlier in the document, several payment methods are accepted at stores of Kappe' and SAR including cash, debit and credit. Furthermore, the contract with Schiphol Group obliges the retailers to accept different currencies in payments
- ❖ **Safety and trust:** customers favour a safe purchase environment. It is also crucial that employees are experienced in providing services and make few mistakes in PoS transactions.⁹

All of the systems currently used as well as the suggestions will allow for reversible transactions, and use of different payment instruments and currencies. Moreover, given the location of shops there will be almost no complications with regards to customer safety and trust. Hence, it is unnecessary to compare different cases with regards to them and the comparison will be done only with attention to customer service availability rate. This will provide insight into how available the employees are to offer sales services to customers as opposed to the time they need for cash handling tasks delegated to them.

5.3. Success criteria

Among the criteria/ performance indicators listed, some are not of particular significance in assessing the eventual effectiveness of the suggested solutions.

Once the objectives of a project are achieved, it can be claimed that it has been a success. Assessment is generally done on three criteria: cost, time (schedule) and quality. As suggested by Freeman and Beale (1992), and Riggs et al. (1992), other less tangible project success criteria should also be accounted for from the respective standpoint of project participants.⁴²

The objective is to find alternative solutions that can “enhance the efficiency of cash handling processes. This can have several facets. In the previous section, the criteria from the perspective of Kappe' and SAR, their employees and customers were listed. This report is the result of a study to address the requirements of Kappe' and SAR as clients. After discussions with representatives of both companies four main categories have been identified:

- A. Costs (including staff costs, technology costs, bank/ CiT Company costs, rent fees, etc.)

¹ $1 - \frac{\text{average time spent on cash handling tasks by each employee in each shift}}{\text{total working time of each employee in each shift}}$

- B. Availability rate for customer service (i.e. amount of time in the working shift employees would have for their core activities considering the time expended on cash handling tasks)
- C. Risks and potential security issues involved in a process
- D. Ease, transparency and uniformity of the process at different shops

It is possible to provide the desirable insight into suggested alternatives with regards to the success criteria in two ways:

1. Quantitative and qualitative assessment of alternatives:

In this way, estimates of costs will be accompanied with qualitative assessment of risks, availability of employees for customer service, and transparency and uniformity. Selection of the desirable alternative would be done mainly on the basis of costs and with a minor attention for qualitative attributes of suggested processes.

2. Overall ranking of alternatives using multi-criteria decision making techniques:

In this way, Analytic Hierarchy Process (AHP) methodology will be used. With assistance from AHP, priorities of each success criterion will be identified for each company. A comparison between alternatives with regards to each criterion will be done. Finally, an overall assessment will be provided and thereby the alternatives will be ranked.

Given the prominent significance of costs for Kappe' and SAR at the moment, the first option will be the basis for selection of an alternative by both companies in this report. However, the second option allows for a revision of weights assigned to success criteria at a later stage. Therefore, retailers will be able to verify whether the selected solution is indeed the best in different circumstances and time periods. Consequently, chapter 8 will be dedicated to use of Analytic Hierarchy Process (AHP) as a multi-criteria decision making methodology.

5.4. Benchmarks

In chapter 4, the costs of different cost categories in current processes of cash handling at Kappe' and SAR were calculated. Then by studying the results, the categories with large shares in total costs were identified. It is important to take these conclusions into consideration when developing alternative solutions for cash handling. On the other hand, investigation of cash handling processes used by other retailers is indispensable to developing alternative solutions. In other words, using different cash handling processes, as a benchmarking tool, is of great value. Therefore, discussions were held with finance manager security manager or store manager of other retail groups active either within or outside the airport.

In discussions with other retail groups, insight was gained into advantages and disadvantages of their cash handling processes. Some of these processes have been considered to be applicable to/ suitable only for specific cases depending on the type and size of business and area of activity. Overall, the observed/ discussed processes of cash handling can be categorized as organizational and functional. Figure 18 shows the sub-categories of each.

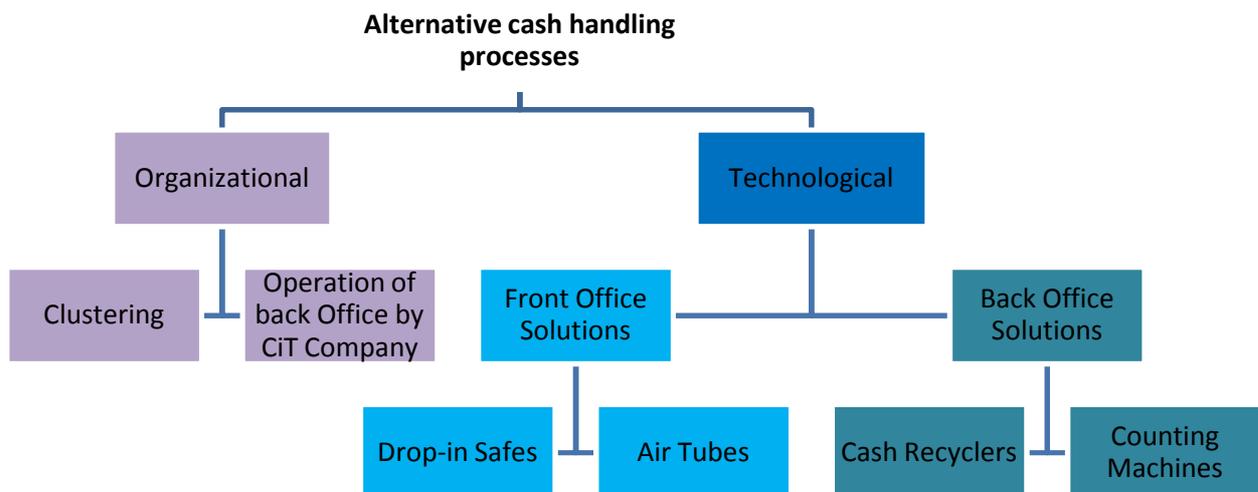


Figure 18: Different cash handling processes as benchmarks

These benchmarks are used in different sections in developing alternatives. Below their application is briefly explained.

1. Organizational practices

a. Clustering:

Clustering refers to cash handling processes in which transactions handled by more than one employee are collected in a shared seal bag/ drop-in safe/ till. While being closed increases safety through reducing the risk of robbery and embezzlement, it comes at the cost of a relatively low transparency of the cash handling process. This is because records of transaction amounts will not be directly available for each individual employee. In case of cash shrinkage, such an insight can be provided through additional and random counting of tills/ drop-in safes, rotating suspicious employees across cash registers and reviewing videos recorded on surveillance cameras. Clustering is considered appropriate when risk of cash shrinkage is high and a closed cash handling process can enhance safety. On the other hand, clustering is useful when the average values of transactions are not significant. In this case, it is unnecessary to have detailed information on the transactions handled by each individual employee.

Clustering is common among downtown retailers. It will be investigated further on for the case of SAR.

b. Operation of back office by CiT Company:

Different cash handling processes call for varying levels and types of activities to be carried out by employees or store managers. Apart from high risk of cash shrinkage, large reliance on staff for cash handling activities can deter them from focusing on core, sales-related tasks. With assistance of skilled experts at CiT companies, retailers can select the right cash handling processes.

With growth in type of services offered, many retailers outsource (parts of) their cash handling activities to CiT companies. Examples have been found among not only downtown retailers, but also those doing business at the airport. Outsourcing cash handling to G4S can also be an option for Kappe' and together.

2. Technological practices

a. Front office solutions

- **Drop-in safes:**

Clustering is a common property of systems where drop-in safes are used. Drop-in safes allow for closed cash handling process starting at the PoS. They are normally scanned before employees start using them so that the employees who have shared a safe, can be easily recognized. This facilitates investigations in case of cash shrinkage. At desired intervals they are replaced and taken to the back office to be counted and/or picked up by CiT companies.

In this study, application of drop-in safes will be investigated for SAR. Given that uniformity in cash handling processes is desired and 5 shops of Kappe' have recently adopted the new system, it is not favourable to study this alternative for Kappe'

- **Air tubes:**

Air tube system (pneumatic tube system) is useful because it not only provides a closed cash handling cycle, but also eliminates the need for employee intervention to replace cash containers. At desired intervals, containers (or drop-in safes) are vacuumed to the back office and are prepared to be picked up by CiT Company. When replacing drop-in safes manually is considered time-consuming and/ or risky, air tubes eliminate such issues.

Air tubes are mostly used by downtown retailers. Such a system calls for a central location as cash office to which all cash containers can be automatically transferred. Given the limited area available at Amsterdam Airport Schiphol to retailers, high rent fees and most importantly uncertain layout planning, it is not possible to implement this alternative at the moment. However, in the long run, this solution might become feasible.

b. Back office solutions

- **Cash recycling machines:**

Cash recycling machines have become more popular among retailers in recent years. They reduce the time spent by employees on cash handling activities. This is especially significant at the end of shifts because counting the money and reconciliation with records can be carried out quite fast by the machine. In addition, notes can rotate among employees so that small denominations (and different currencies) are sufficiently available to a larger number of them. As a result, the need to additional floats during the working shifts is eliminated or reduced. Furthermore, with cash recycling machines, the process of cash handling can become more centralized and thus more easily supervised. It is also noteworthy that processes will be highly transparent as records of withdrawn and deposited amounts will be available for each individual employee.

Cash recycling machines are already being used by some retail groups at Amsterdam Airport Schiphol. Kappe's new system, as previously explained, is one example. At a first glance, cash recycling machines seem to provide the desired properties for cash handling at Kappe' and SAR. Therefore, installing them will be investigated for the companies separately as well as together.

- **Counting machines:**

Counting machines have been used by many retailers for many years. They can speed up the counting of cash at the end of working shifts and also identify counterfeit notes.

When reliance on employees for handling cash is high, using counting machines can contribute to accuracy and speed of the process. Even purchasing such machines with no other change can enhance the efficiency of the processes. Employees are more in need of counting machines when large volumes of cash are counted at once. One example is when tills are shared among employees and counted once a day (rather than using separate tills for employees). Tills are used in such a way when drop-in safes are installed at the PoS. Therefore, in the alternative with drop-in safes for SAR, discussed later in this report, using counting machines has been recommended.

Table 29 provides an overview of the benchmarks and their application in developing alternative cash handling processes for Kappe' and SAR.

Table 12: Application of benchmarks in developing new cash handling processes

Benchmarking tool	Application in alternatives		
	Separate for Kappe'	Separate for SAR	Joint
Clustering, drop-in safes and counting machines		✓	
Cash recycling machines	✓	✓	✓
Operation of back-office by CiT Company	✓	✓	✓
Air tubes			✓ (recommendations)

Summation

This chapter started with a stakeholder analysis to clarify the role of different parties and the extent to which they must be involved in developing new cash handling processes for Kappe' and SAR. The most critical stakeholders, are considered to be Kappe' and SAR's management, followed by their employees and customers. Given their interests, criteria for assessment of cash handling processes were specified from the perspective of each of these groups. The most significant criteria (i.e. success criteria) are: costs, availability rate of employees for customer service, risks, and transparency and uniformity of the process).

In the next section of this chapter benchmarks were set by visiting cash handling processes of other retailers. Technological and organizational changes are expected to bring more efficient cash handling processes at Kappe' and SAR. The success criteria along with benchmarks will serve as the basis for developing alternative cash handling processes in chapter 6. Furthermore, the success criteria will be used in multi-criteria analysis conducted through AHP methodology in chapter 8.

Chapter 6:

Alternative solutions for improving the efficiency of cash handling

In this section, alternative cash handling processes will be designed based on the benchmarks and with attention for sources of costs of cash handling investigated in previous chapters. These alternatives will then be assessed quantitatively (based on costs) and qualitatively (based on the other success criteria). Figure 19 shows the focus of chapter 6 as part of the research. An overview of alternatives that are assessed in this chapter is presented in Figure 20.

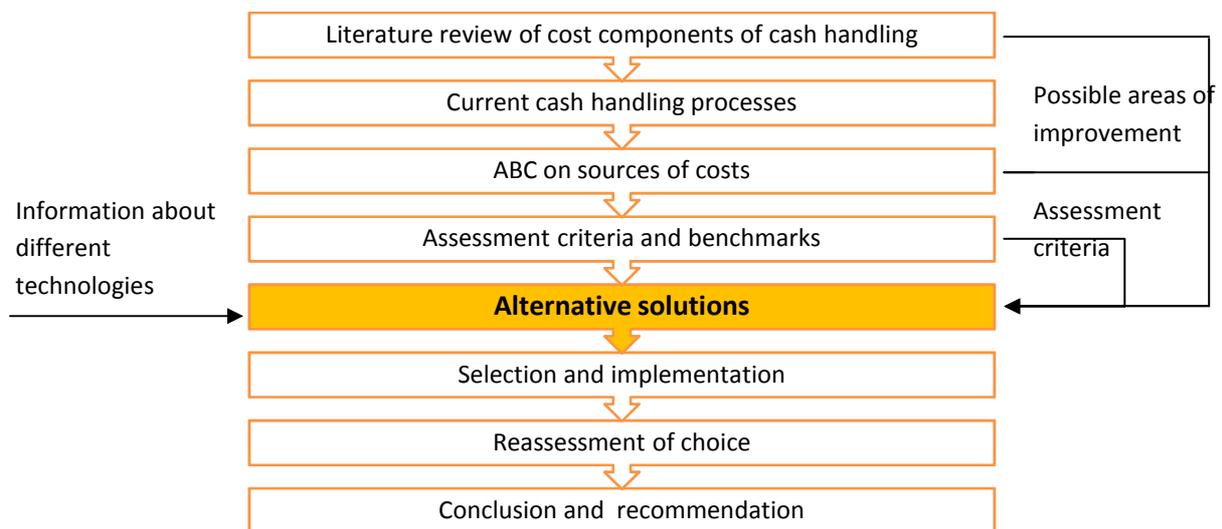


Figure 19: Focus of chapter 6

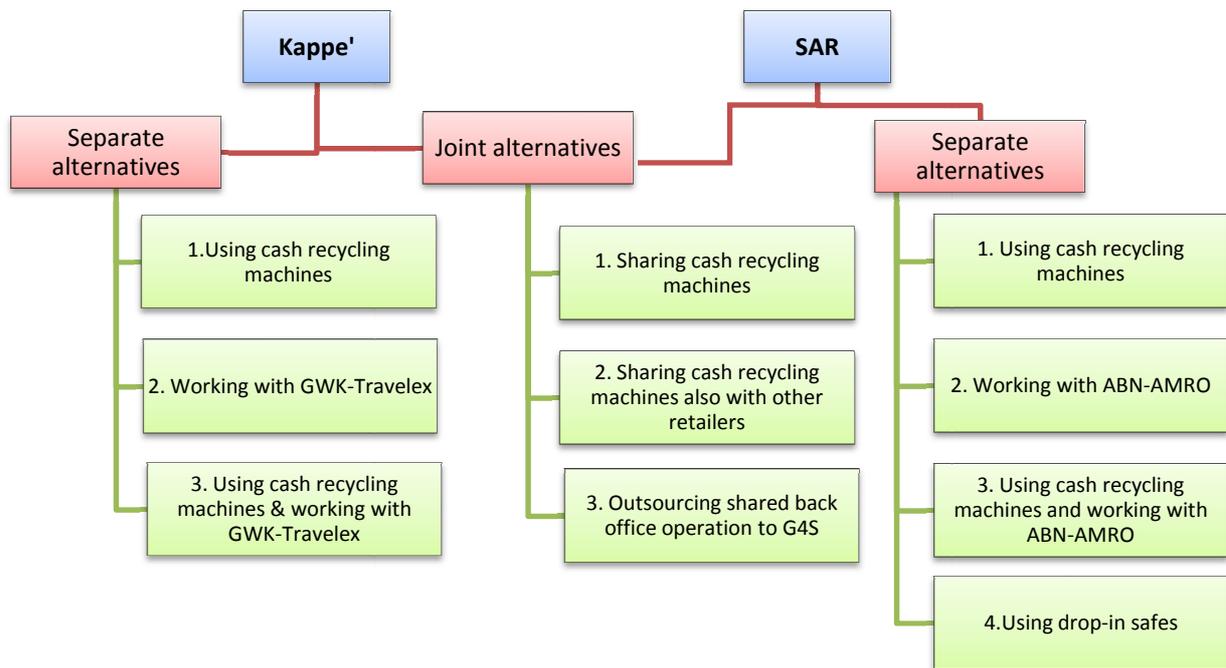


Figure 20: Alternative cash handling processes for Kappe' and SAR

6.1. Constraints and requirementsⁱ

In designing alternatives with use of cash recycling machines, the following conditions need to be satisfied:

1. Independent operation of departure lounges

Independent use of cash recycling machines in lounges is a main step for eliminating the downsides of shared operations between lounges. In this way less time will be lost for travelling to the cash office, and lower risk would be faced. It is therefore, crucial to decide on the optimum number of machine sets separately for lounge 1, lounge 2, and lounges 3 and 4ⁱⁱ.

2. Capacity of cash machine

Each cash machine consists of 12 escrows each of which can contain a maximum of 400 bank notes. The arrangement for the machine currently used at Kappe' is as shown in Table 30.

ⁱ These conditions hold only in alternatives with use of cash recycling machines.

ⁱⁱ Since there are only 2 shops of Kappe' (SBF and Branded) in lounge 4, there is no need to investigate the number of machines for these lounges separately. The two shops in lounge 4 should work jointly with those of lounge 3.

Table 13: Current arrangement of escrows in cash recycling machine of P&C West

Number of escrows	Notes
3	€50
2	€20
1	€10
1	€5
1	€100/€200/€500
1	\$1
1	\$5
1	\$10
1	Other \$ notes

The arrangement is equivalent to a capacity of around €120k. The required number of machines must also be determined such that average daily amounts to be collected in each machine do not exceed this capacity. Moreover, machines need to be skimmed even if one of the escrows is full.¹ Thus, skimming must be done in advance of reaching its maximum capacity.

3. Point of skimming

Not disclosed in this document

4. Frequency of skimming

Given the average daily transactions in each lounge, the number of machines must be determined such that each needs to be skimmed no more than once a day (i.e. 7 or fewer times each week). This is important because it prevents

- large amounts of administration for skimming machines each day; and
- increase in costs as a result of high skimming wages (High wages are applicable to skimming on the weekends that happens when a machine needs to be skimmed more than three times a week).

6.2. Separate alternatives for Kappe'

In this section, alternative cash handling processes for Kappe' will be introduced and evaluated.

¹ This arrangement can be changed if desired.

Not disclosed in this document

6.2. Separate alternatives for SAR

6.2.1. Using cash recycling machines (S1)

It is suggested for SAR to start using recycling machines (as Kappe' currently is in lounges 3&4). It is assumed that SAR will continue to work with GWK-Travelex. Considering the change in the cash handling process, the amounts of time spent by employees and administrative staff on different tasks will differ. In addition, the number and location of machines need to be specified. Costs of different categories are calculated in Appendix 4 and the results are presented briefly in Table 42.

Table 14: ABC for alternative S1

Cost category	Cost (€)	Cost per transaction (€)	Cost per Euro of transaction (€)	Share in total costs	Percentage change compared to current situation
Staffs' cash handling tasks	156,844	0.09	0.0039	54%	-32%
GWK-Travelex fees	92,000	0.05	0.0023	32%	0%
Technology costs	41,807	0.02	0.0010	14%	-
Total costs	290,651	0.16	0.0072	100%	-10%

The results of ABC show that the enhanced automation in the procedure brought about by cash recycling machines, reduces the amount of time employees spend on cash handling by 32%. Despite the investment costs for machines, this can lead to 10% saving on total costs of cash handling. Handling of each transaction would then cost €0.16.

Qualitative assessment

Figure 24 provides an overview of the changes this solution will cause compared to the system currently used at SAR.

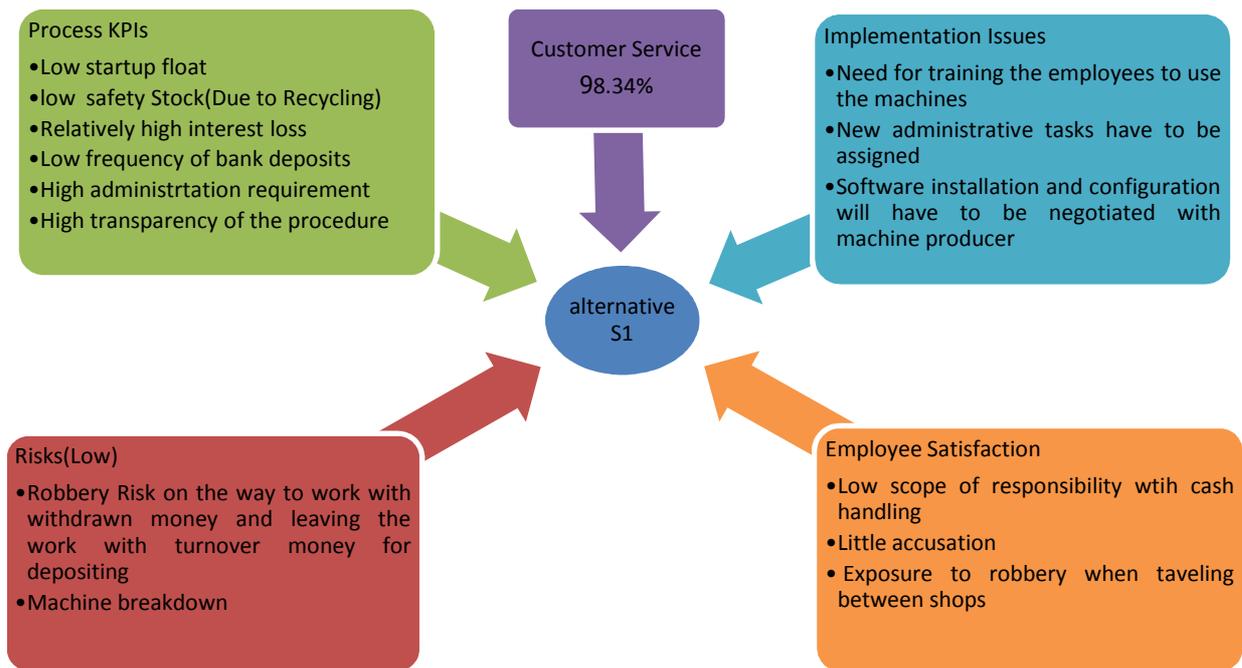


Figure 21: Qualitative assessment for alternative S1

The detailed risk analysis for this solution can be found in Appendix 3.

6.2.2. Working with ABN-AMRO (S2)

In this alternative, it is assumed that SAR would keep its current processes of cash handling, but start working with ABN-AMRO instead of GWK-Travellex. Steps of calculation can be found in Appendix 4. The results of calculations are shown in Table 43.

Table 15: ABC for alternative S2

Cost category	Cost (€)	Cost per transaction (€)	Cost per Euro of transaction (€)	Share in total costs	Percentage change compared to current situation
Staffs' cash handling tasks	270,848	0.15	0.0067	97%	+18%
ABN-AMRO fees (after compensation)	7,534	0.00	0.0002	3%	-92%
Total costs (after compensation)	278,382	0.16	0.0069	100%	-14%

This alternative increases cash handling time of staff by 18% compared to the current system. However, working with ABN-AMRO can result in a significant cost saving in this category. On the whole, a cost reduction of 14% can be achieved if SAR signs a contract with ABN-AMRO, even if no change in procedures is adopted. At these costs, handling of each transaction would then cost €0.16 which is €0.02 lower than the average at SAR's current systems.

Qualitative assessment

Figure 25 includes a brief description of qualitative properties of alternative S2.

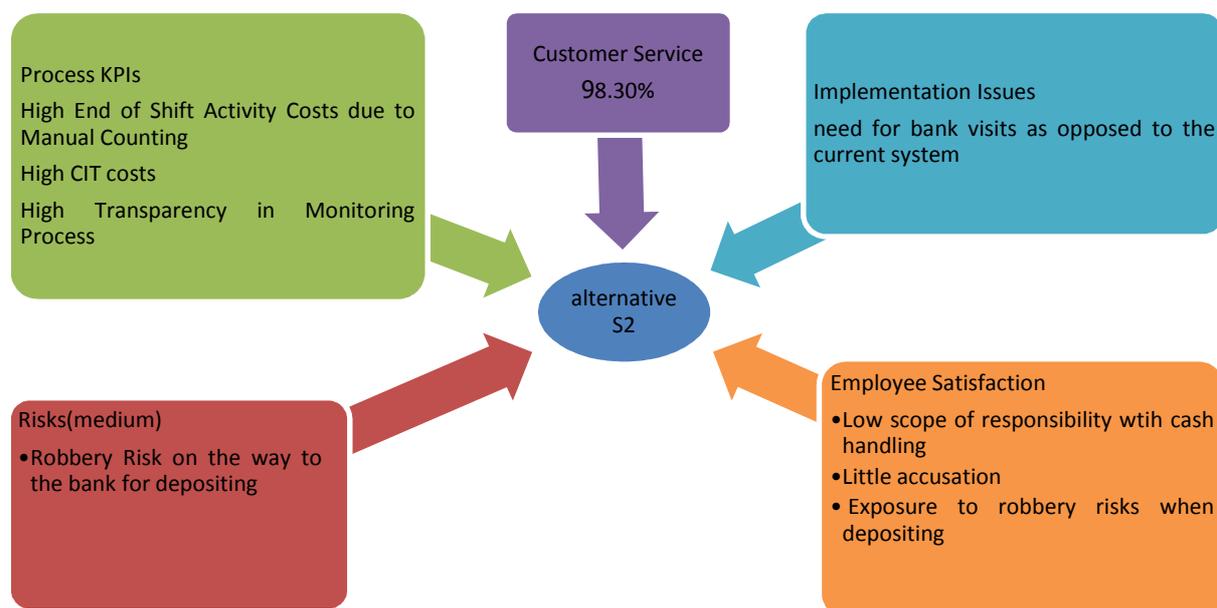


Figure 22: Qualitative assessment for alternative S2

Detailed risk analysis is shown in Appendix 3.

6.2.3. Using cash recycling machines and working with ABN-AMRO (S3)

SAR can purchase 3 sets of cash recycling machines as proposed in alternative S1 and sign a contract with ABN-AMRO for depositing the collected amounts. In Appendix 4, calculation of costs is done. Table 44 depicts the results.

Table 16: ABC for alternative S3

Cost category	Cost (€)	Cost per transaction (€)	Cost per Euro of transaction (€)	Share in total costs	Percentage change compared to current situation
Staffs' cash handling tasks	159,824	0.09	0.0040	109%	-30%
ABN-AMRO fees (after compensation)	-55042	-0.03	-0.0014	-38%	-160%
Technology costs	41,807	0.02	0.0010	29%	-
Total costs (after compensation)	146,589	0.08	0.0036	100%	-54%

By adopting this alternative, the time spent on cash handling by the staff can be reduced by 30% compared to the current system. Working with ABN-AMRO can result in a significant cost saving as well. Overall, a cost reduction of 54% can be achieved. In this case, each transaction would cost only €0.08 which is €0.10 lower than the average at SAR's current systems.

Qualitative assessment

Figure 26 includes a brief description of qualitative properties of alternative S3.

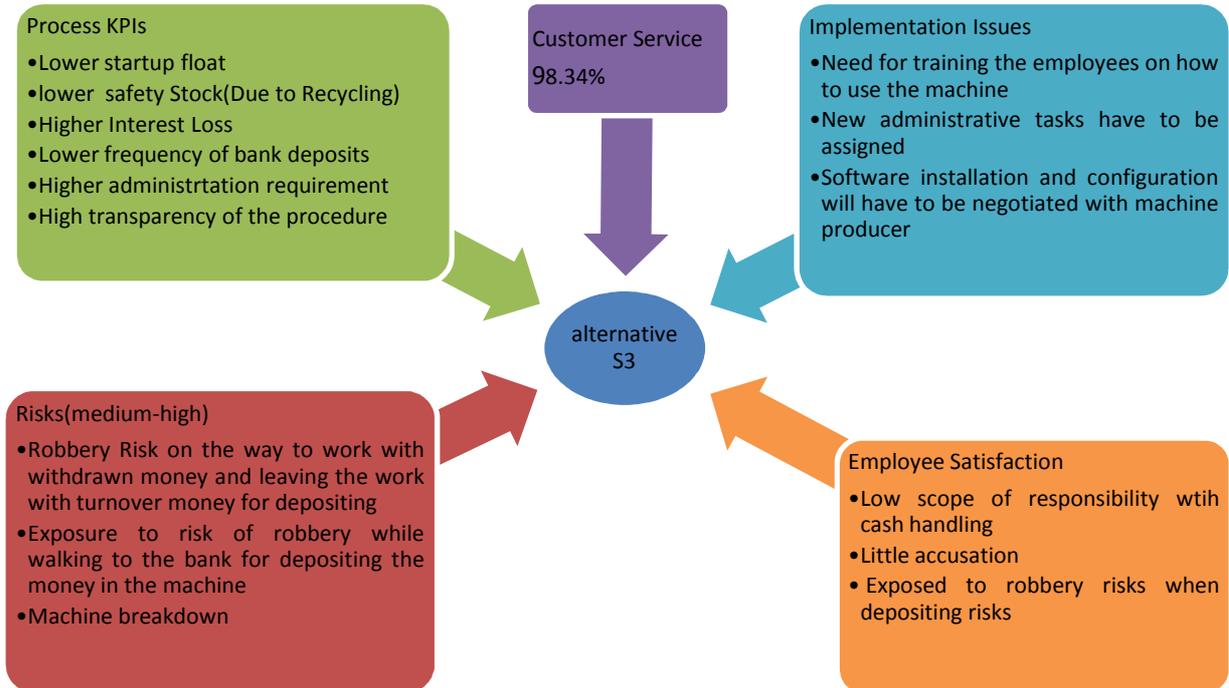


Figure 23: Qualitative assessment for alternative S3

6.2.4. Using drop-in safes (S4)

It is possible to start using drop-in safes at SAR. For this purpose, safes should be purchased and installed in cash registers at the beginning of each day. Employees working on the same cash register on a given day will form a cluster and jointly deposit the collected amounts during the day in the drop-in safe. At the end of each day, the drop-in safe will be taken to the back office. After being counted by counting machines, the safes are prepared for pick-up by CIT Company and an empty safe will be installed at each cash register for the next day. Figure 27 depicts the cash handling process using drop-in safes.

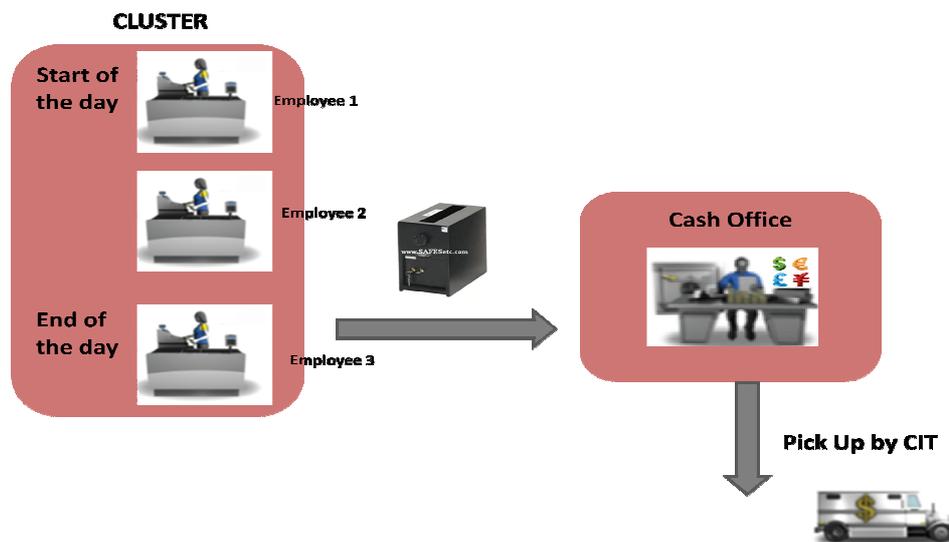


Figure 24: Cash handling process using drop-in safes

Calculating costs of cash handling is done in Appendix 4. Table 45 shows the results of ABC for this alternative.

Table 17: ABC for alternative S4

Cost category	Cost (€)	Cost per transaction (€)	Cost per Euro of transaction (€)	Share in total costs	Percentage change compared to current situation
Staffs' cash handling tasks	71,104	0.04	0.0018	41%	-69%
GWK-Travelex fees	92,000	0.05	0.0023	54%	0%
Technology & other costs	8,620	0.00	0.0002	5%	-
Sum	171,724	0.10	0.0042	100%	-47%

With around €172k per year, a cost saving of 47% would be achieved and each transaction would cost around €0.10. Despite the large cost savings, using drop-in safes can have disadvantages summarized in the qualitative assessment below.

Working with ABN-AMRO:

In case SAR chooses alternative S4 while working with ABN-AMRO instead of GWK-Travelex, Euro and foreign currencies need to be separated. So the suggestion would be to allocate only one of the checkout points to payments in foreign currencies. This check out point can have 2 drop in safes: one for Euro and one for foreign currencies.

Qualitative assessment

Figure 28 includes a brief description of qualitative properties of alternative S4.

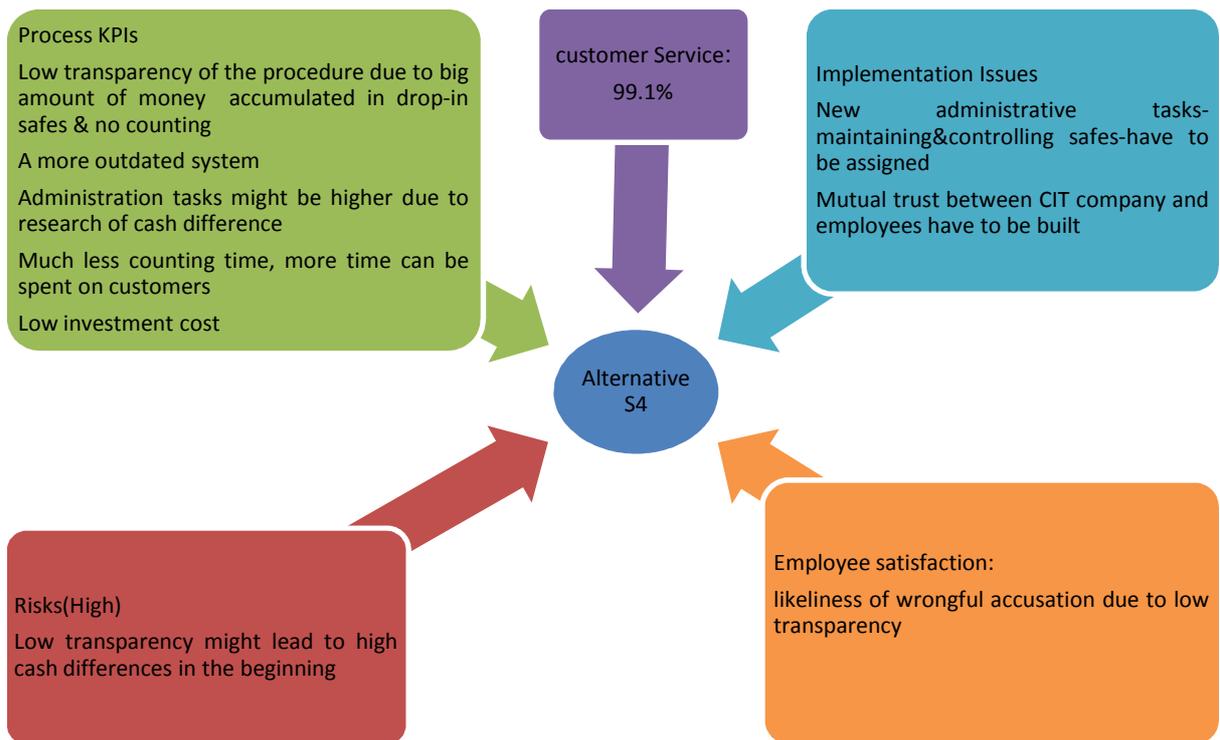


Figure 25: Qualitative assessment for alternative S4

The flow charts in Appendix 5 shows the process and control scheme for using drop-in safes. Detailed risk analysis can be found in Appendix 3.

6.3. Joint alternatives for Kappe' and SAR

Apart from individual small and major improvements, the possibility of collaboration in cash handling and potential cost savings of it are of specific interest to Kappe' and SAR. In order to achieve a uniform, transparent, fast, reliable and state-of-the-art process, it is plausible to make use of cash recycling machines similar to the ones currently in use by Kappe' in Lounge 3.

In this section, using cash recycling machines as part of a collaborative cash handling process will be investigated in three variations:

1. Shared use of cash recycling machines by Kappe' and SAR
2. Shared use of cash recycling machines by Kappe', SAR and other retailers at Amsterdam Airport Schiphol
3. Shared use of cash recycling machines by Kappe' and SAR while outsourcing back office operations to G4S

Each of these alternatives is assessed separately below. Once assessment is completed, these alternatives will be compared with the separate alternatives.

6.3.1. Shared use of cash recycling machines by Kappe' and SAR (J1A)

6.3.2. Shared use of cash recycling machines by Kappe', SAR and other retailers at Amsterdam Airport Schiphol (J2)

Not disclosed in this document

Results of alternative J1A show that if Kappe' and SAR join forces in using cash recycling machines, they can save on costs of cash handling. It is also interesting to check whether with other retailers' collaboration, it is possible to attain further cost reduction. Table 48 shows a general overview of costs in this case. The detailed calculation of costs of this alternative can be found in Appendix 4.

Table 18: ABC for alternative J2

	Cost category	Cost for Kappe'/ SAR (€)
Static expenses	Staffs' cash handling tasks	Equal to alternative J1A
	Administration for monitoring finances	Equal to alternative J1A
Dynamic expenses	Administration on machines	Depending on the number of machines
	Joint cash office organization	Depending on the number of retailers
	ABN-AMRO fees (after compensation)	Depending on the total transactions
	Technology costs	Depending on the total transactions
	Joint cash office rent	Depending on the number of machines
	Total (after compensation)	To be determined using the charts below

Depending on the number of retail groups joining Kappe' and SAR and their annual transactions, different amounts of cost saving can be achieved by Kappe' and SAR. Charts 6 and 7 show the result of sensitivity analysis for Kappe' and SAR based on the number of retailers that might join them and sum of their annual transactions.

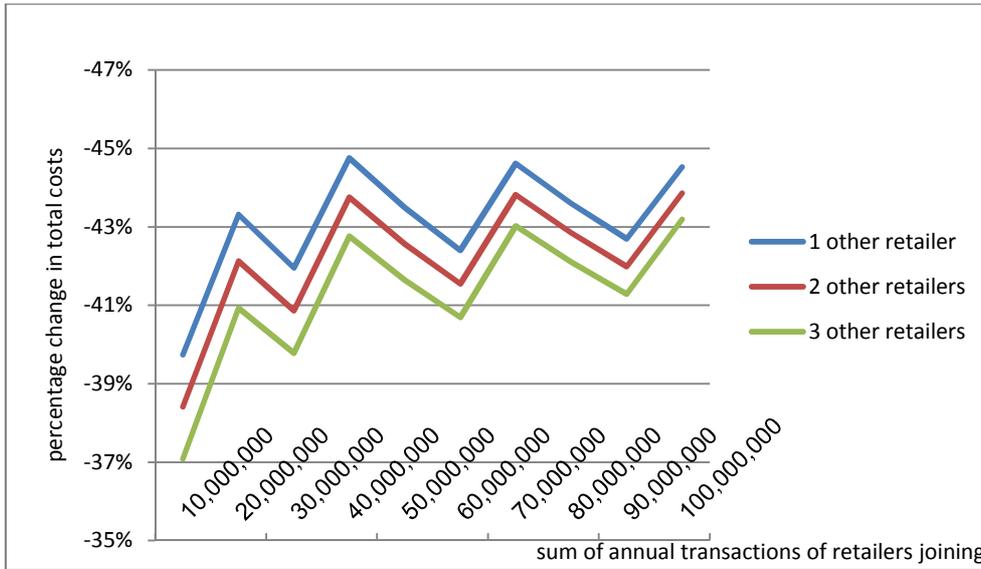


Chart 6: ABC for Kappe' for alternative J2

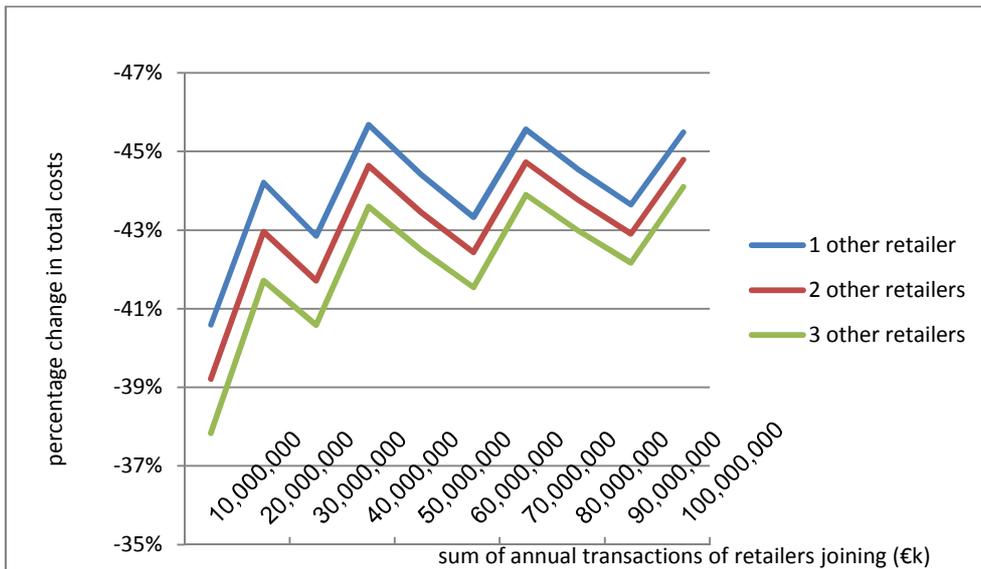


Chart 7: ABC for SAR for alternative J2

The fluctuation in each chart is because with a specific number of retailers joining costs can be divided among more companies and therefore larger saving is achievable. However, at certain transaction amounts, more machines would be needed. Purchasing of additional machines leads to a fall in cost savings. This fall stops once the transactions are sufficiently large to use the available capacity of the machines.

Each chart can also be compared for different number of retailers joining Kappe' and SAR. It can be seen that at a given transaction amount, fewer retailers contribute to larger cost reduction. This can be explained by increased complexity of administration as more retailers become involved in joint cash handling process which is in turn associated with a rise in costs.

It can be concluded that in alternative J2, the number of retailers joining Kappe' and SAR and their annual transactions determine the possible cost savings. If both companies can achieve a larger

percentage of saving compared to other alternatives, they might find it favourable to scale up the processes.

Qualitative assessment

Figure 30 includes a brief description of qualitative properties of alternative J2.

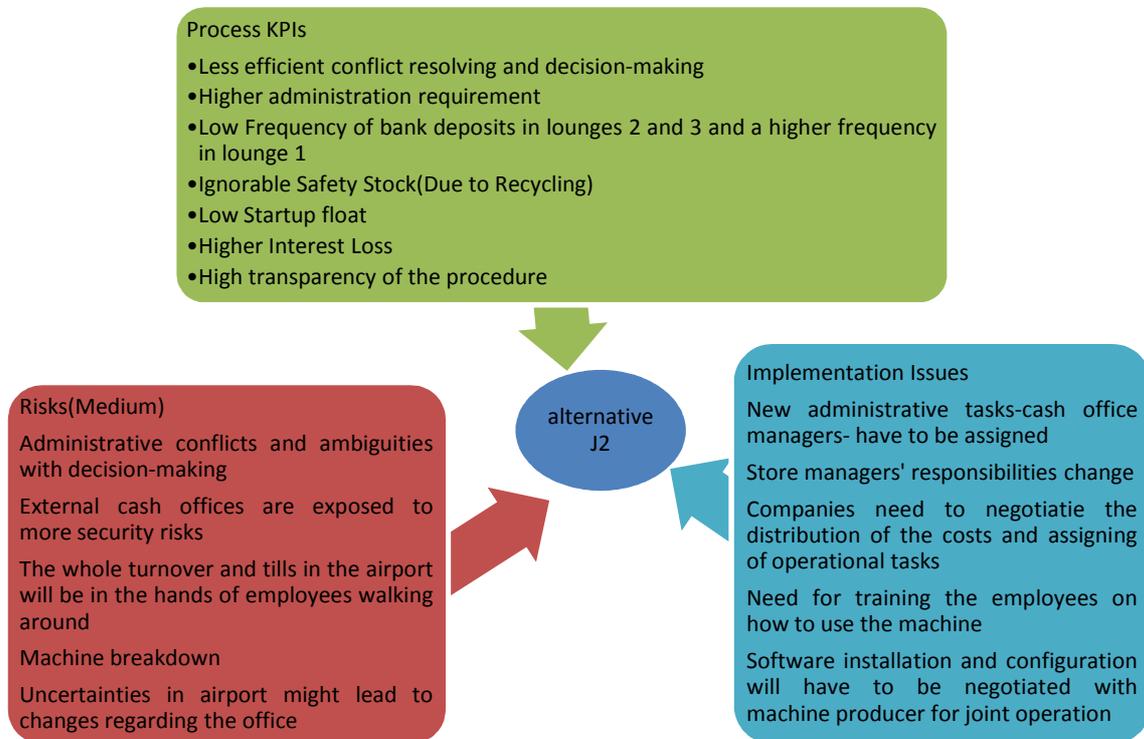


Figure 26: Qualitative assessment for alternative J2

6.3.3. Shared use of cash recycling machines by Kappe' and SAR while outsourcing operation of back office to G4S (J3)

As mentioned previously, Kappe' and SAR have an interest in a joint cash handling process and expect to achieve further cost savings through such a process. In the previous two alternatives, the costs of cash handling for collaboration between Kappe' and SAR, and other retailers were estimated. Apart from these alternatives, any possibility of reducing time spent on cash handling by staff is well received by Kappe' and SAR. To achieve this purpose, it is anticipated that outsourcing the operation of back office to an external party (i.e. a CiT company) can enhance the efficiency of cash handling. G4S has recently taken over the back office of one retailer at Amsterdam Airport Schiphol and is well acquainted with the general requirements of retailers at the airport. Consequently, G4S was asked to conduct a study on the case of Kappe' and SAR and propose a joint cash handling process for them.

Based on the provided information regarding cash handling processes and Kappe' and SAR, G4S compared two options for a new cash handling process: centralized and de-centralized. In Table 49 advantages and disadvantages of these options are listed.

Table 19: Options proposed by G4S in alternative J3

Options	Advantages	Disadvantages
Option 1: Centralized	<ul style="list-style-type: none"> Lower individual costs Central circulation/ recycling of petty cash/ change Single/ dual location(s) for servicing by G4S Dual solution covers back-up scenario 	<ul style="list-style-type: none"> Airport site deposit distance Need for centralized and shared rooms Dual cash flows results in multiple devices (notes and coins)
Option 2: De-centralized	<ul style="list-style-type: none"> Direct deposit facility on store level Less time consuming deposit process (shorter walking distances) 	<ul style="list-style-type: none"> No sharing of solution and costs Higher investment for back office security (by G4S, and one supervisor from each company) Costs of multiple CiT services over large area Disturbance of customers' shopping experience by CiT High management and monitoring costs (change and deposits) High costs of large number of hardware

Considering the possibility of cost reduction and cash recycling in a centralized cash handling process, option 1 was selected by G4S to be investigated further.

In order to install option 1, it is suggested by G4S that CASH360¹ cash management concept is implemented by each company separately, but dually managed by G4S. The five major components of cash360 solution by G4S are depicted in Figure 31.



Figure 27: CASH360 solution by G4S⁴³

¹ A complete list of properties of this solution is included in appendix.

For implementation of option 1, two central back office locations must be rented to be used by both companies. Table 50 shows the number of machines required for each of the offices.

Table 20: required number of machines for each of the two joint offices in alternative J3

	Number of cash recycling machines	Number of coin recycling machines
Only for Kappe'	1	1
Only for SAR	1	1
For foreign currencies of both Kappe' and SAR	1	1

Although the deposited amounts by each company can be known, shared deposits would lead to confusion over the amount left in the machines after skimming. In other words, it is unlikely that the companies have equal shares in the amounts and denominations left in the machines. Therefore, despite sharing the back office G4S does not find it advisable for Kappe' and SAR to share the recycling machines for Euros.

According to overall estimations by G4S, for Kappe' and SAR the current annual costs amount to around €800k (including internal costs); while by implementing CASH360 through option 1 explained above, they would be reduced to around €350k (excluding internal costs, processing of foreign currencies by bank, and back office rent).

6.4. Sensitivity analysis for alternatives

As explained before, costs of activities (start, during, and end of shift and administration) in each of the current cash handling systems as well as suggested alternatives, have been estimated based on the unit time spent. The estimates for unit time have been provided as an average by representatives of Kappe' and SAR.

Given the uncertainty of these numbers, it is useful to do a sensitivity analysis to test the variation in the cost estimates for different systems. For this purpose, the percentage change in total costs is calculated for changes in unit time of different cash handling activities. The result is visualized in charts. In this manner, it can be understood how sensitive the cost estimates are to different cost drivers. Also, the cash handling systems with large sensitivity to cost drivers can be identified. The following are the results of sensitivity analysis for the discussed alternatives for Kappe' and SAR.

6.4.1. Sensitivity analysis for Kappe's alternatives

Charts below show the results of sensitivity analysis for different amounts of percentage change for alternative processes proposed for Kappe'.

As chart 8 shows, in alternative 1 the largest variation can be caused by a change in time required for administrative tasks.

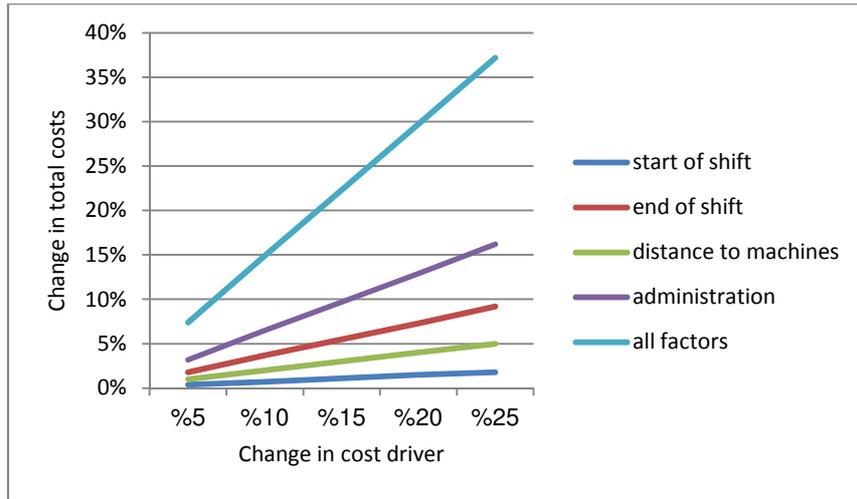


Chart 8: Sensitivity analysis for alternative K1

In alternative K2, changes in the administration time for the shops of lounges 1 and 2, and then 3 and 4 can cause the largest variation (Chart 9).

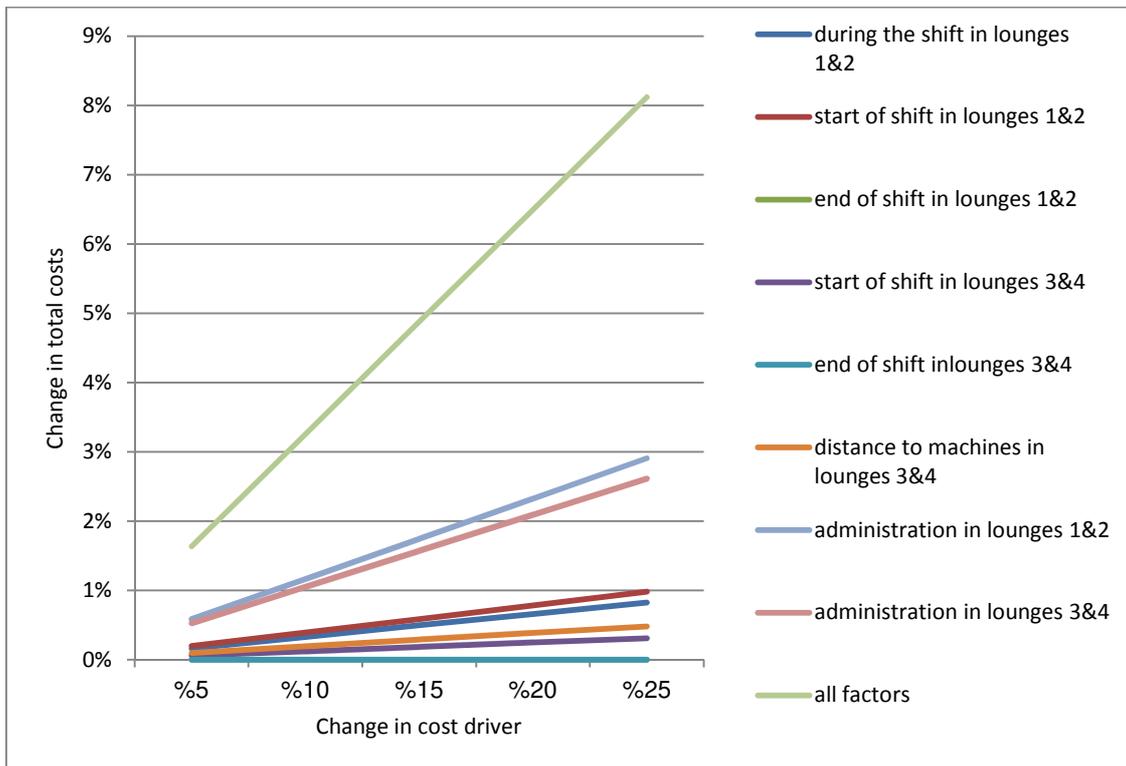


Chart 9: Sensitivity analysis for alternative K2

In alternative K3, costs are most sensitive to changes in administration time. (Chart 10)

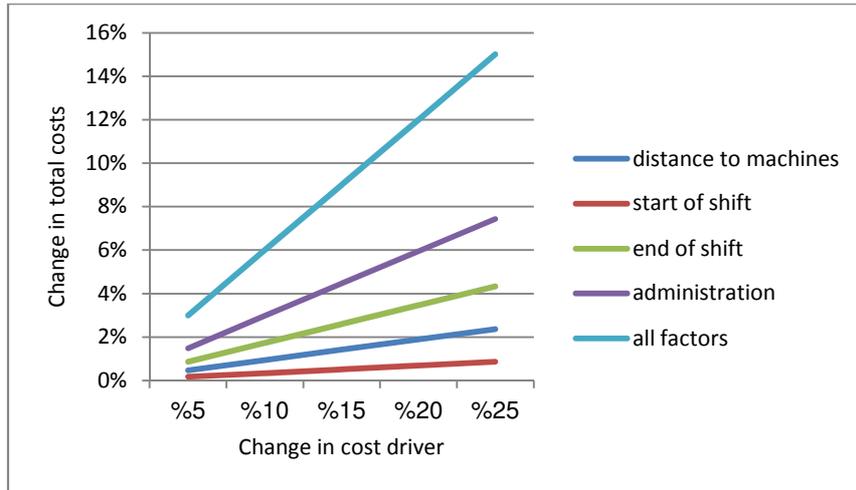


Chart 10: Sensitivity analysis for alternative K3

In alternative J1A, variations in administration time can cause a larger change in total costs compared to other cost drivers (Chart 11).

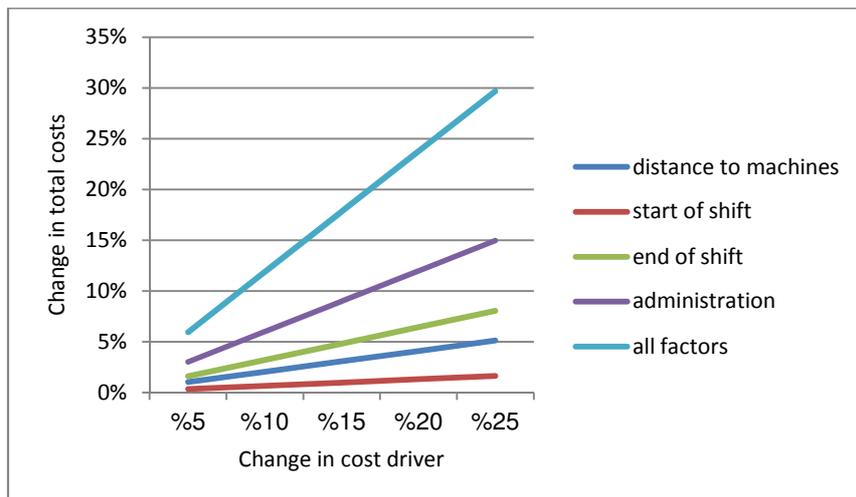


Chart 11: Sensitivity analysis for Kappe' for alternative J1A

Chart 12 shows how much the cost estimates would vary in each of the cash handling systems if all the activity unit times were changed simultaneously (the trend lines corresponding to *all factors* in the charts above). As it can be seen alternatives K1 and J1A show the largest total variations.

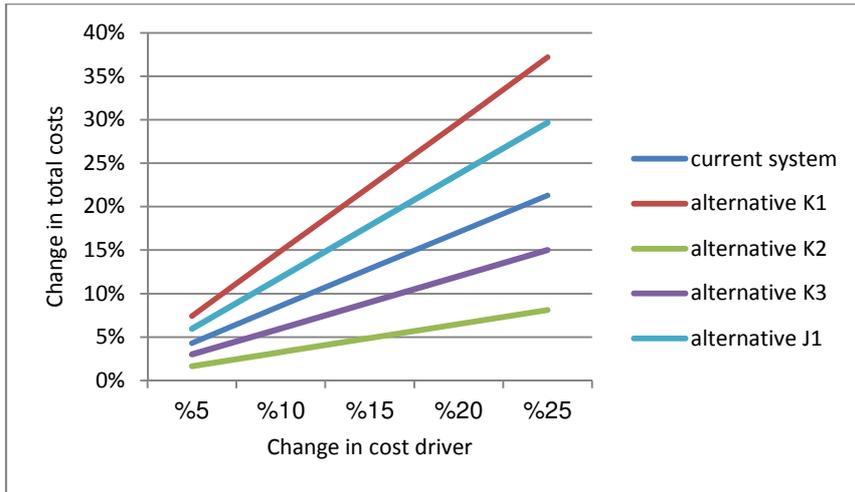


Chart 12: Comparison between sensitivity analysis for different alternatives for Kappe'

In both K1 and J1A, changes in administration unit time are the reason behind a large part of the variations. This is plausible since use of cash recycling machines for all shops involves high reliance on administrative staff for controlling and skimming the machines.

6.4.2. Sensitivity analysis for SAR's alternatives

Charts below show the results of sensitivity analysis for different amounts of percentage change for SAR's alternatives.

In alternative S1, costs can be highly variant with changes in administration unit time (Chart 13).

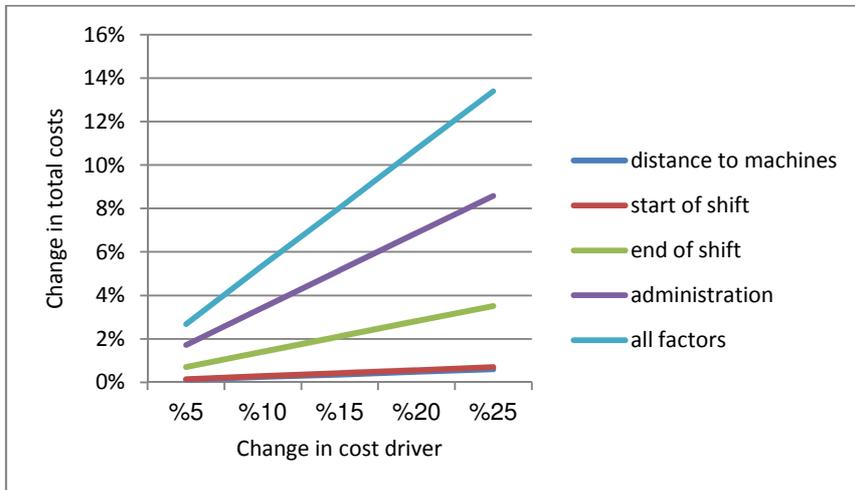


Chart 13: Sensitivity analysis for alternative S1

As shown in Chart 14, in alternative S2 the largest change in costs can be caused by changes in the time for end of shift activities.

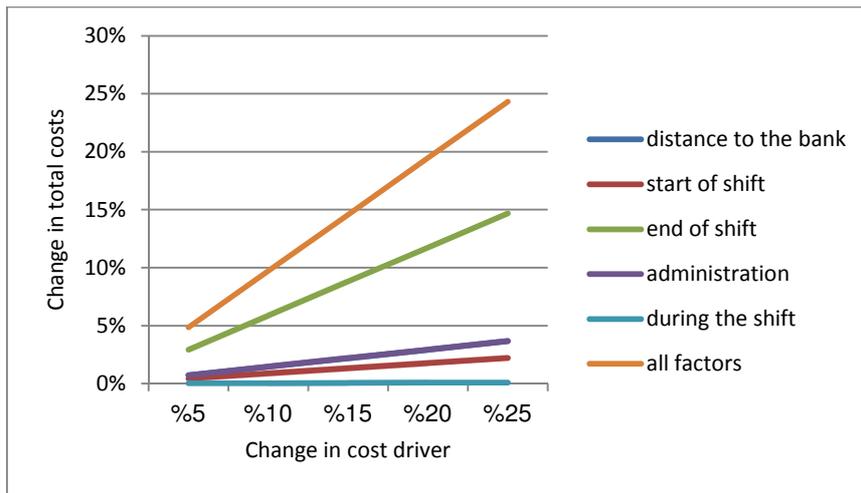


Chart 14: Sensitivity analysis for alternative S2

If administration unit time changed, the costs would change more in alternative S3 than they would if other cost drivers were altered (Chart 15).

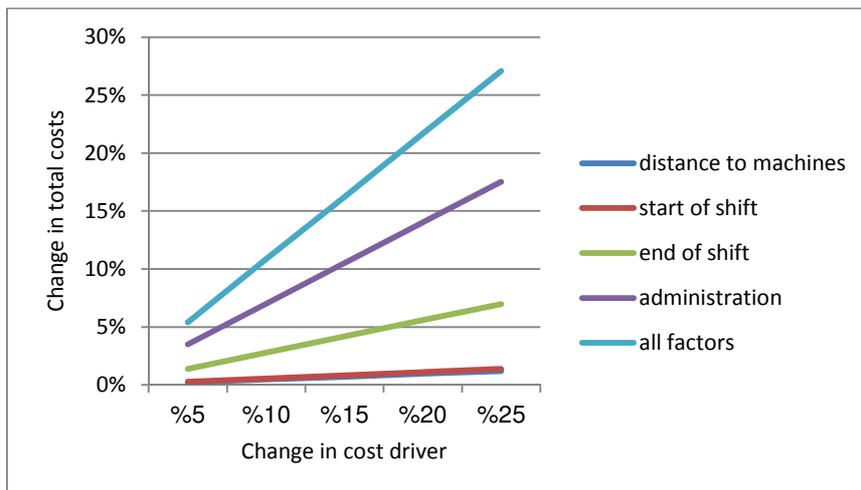


Chart 15: Sensitivity analysis for alternative S3

In alternative S4, the largest variation can be caused by a change in time required for administrative tasks. (Chart 16)

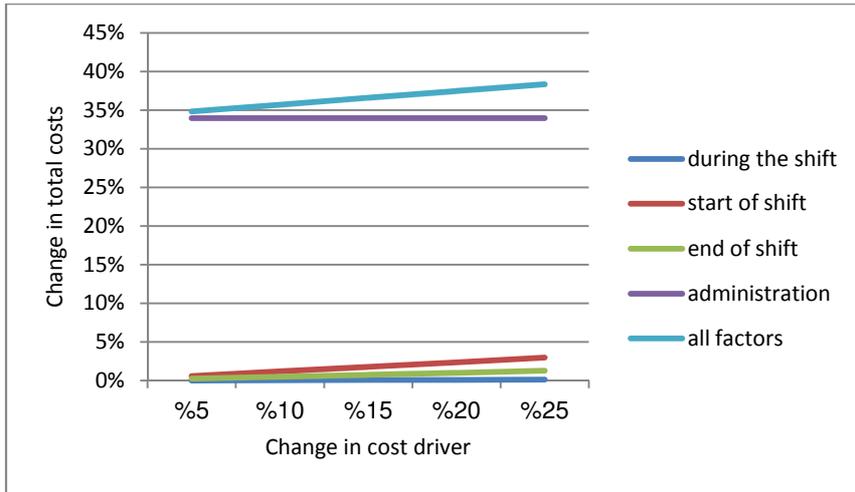


Chart 16: Sensitivity analysis for alternative S4

As chart 17 shows, if administration unit time changes in alternative J1A, the costs will vary more than they would with changes in other cost drivers.

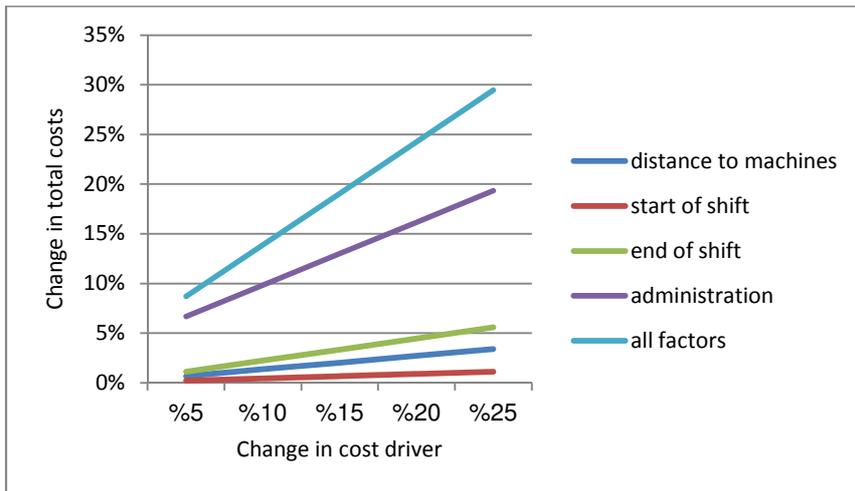


Chart 17: Sensitivity analysis for SAR for alternative J1A

Chart 18 shows how much the cost estimates would vary in each of the cash handling systems if all the activity unit times were changed simultaneously. As it can be seen alternative S4 (use of drop-in safes) is in the lead with the largest variations followed by alternatives J1A and S3.

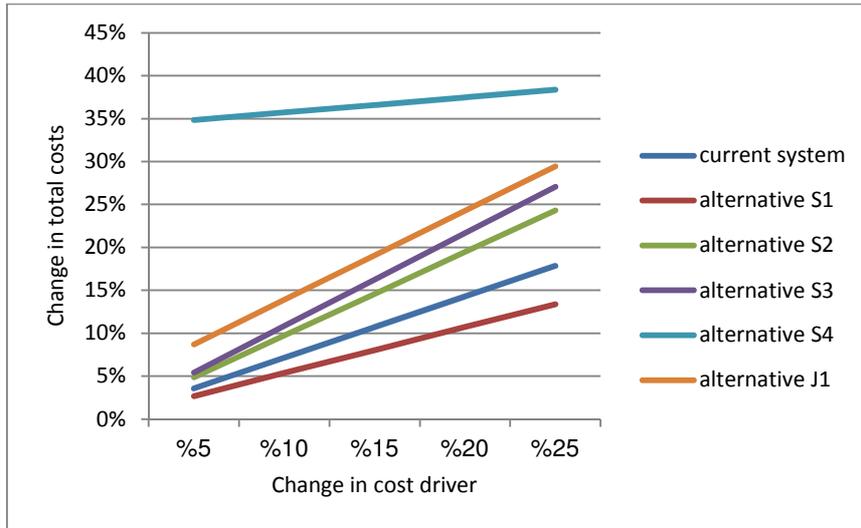


Chart 18: Comparison between sensitivity analysis for different alternatives for SAR

In all three of alternatives S4, J1A and S3, the most sensitivity is observed in administration time. For use of drop-in safes in alternative S4 this can be attributed to low transparency of the process and accordingly the large need for investigation on clusters. On the other hand, for alternatives S3 and J1A, the reason is the important role of administrative staff in maintaining cash and coin recycling machines.

Summation

In this chapter new cash handling procedures were proposed. They were categorized as:

- ❖ Separate alternatives for Kappe'
 - Using cash recycling machines at Kappe' (K1)
 - Working with GWK-Travelex (K2)
 - Cash recycling machines and working with GWK-Travelex (K3)
- ❖ Separate alternatives for SAR
 - Using cash recycling machines (S1)
 - Working with ABN-AMRO (S2)
 - Using cash recycling machines and working with ABN-AMRO (S3)
 - Using drop-in safes (S4)
- ❖ Joint alternatives for Kappe' and SAR
 - Shared use of cash recycling machines by Kappe' and SAR (J1A)
 - Shared use of cash recycling machines by Kappe' and SAR and other retailers (J2)
 - Operation of back office by external party (J3)

For Kappe', alternatives K1 and J1A with respectively 50% and 43% cost saving and for SAR, alternatives S3, S4, and J1A with respectively 54%, 47% and 43% cost saving have been estimated to be the least costly alternatives.

After evaluation of the alternatives, sensitivity of costs to different cost drivers was tested. Among alternatives for Kappe', total costs in K1 and J1A have shown to be most sensitive to changes in cost drivers; and administration unit time is the reason behind it. For SAR, the largest sensitivity was observed in alternatives S4, J1A and S3. In alternative S4 this can be attributed to low transparency of the while in alternatives S3 and J1A, the reason is the important role of administrative staff in maintaining cash and coin recycling

Chapter 7 will be dedicated to selecting the proper alternative from those proposed in this chapter and explaining the implementation steps.

Chapter 7: Selection and implementation

Assessment criteria for cash handling processes were elaborated in chapter 5. In chapter 6 alternative solutions for cash handling at Kappe' and SAR were developed and analyzed quantitatively and qualitatively. This chapter is dedicated to comparing the proposed alternatives based on the desired criteria in order to select the favourable one. Once the proper alternative(s) are chosen by representatives of Kappe' and SAR implementation guidelines will be provided. Figure 32 shows the focus of chapter 7 as part of the research.

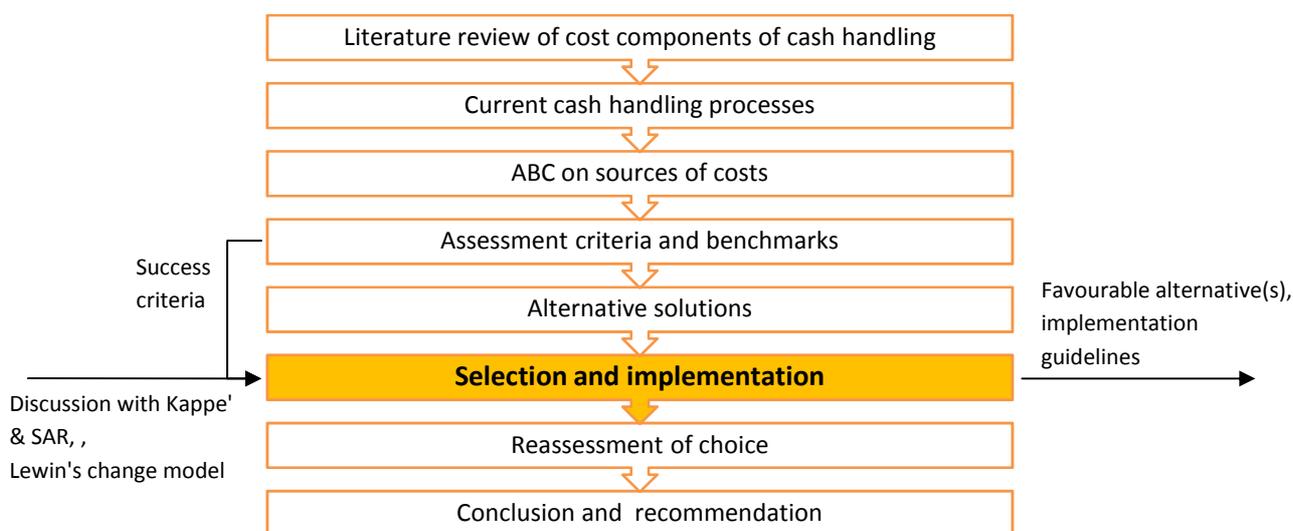


Figure 28: Focus of chapter 7

1.1. Selection

In the previous sections, different alternatives were proposed to enhance the efficiency of cash handling processes at Kappe' and SAR. These alternatives differ not only in terms of costs, but also involved risks, availability of employees for customer service, and transparency of the process. For instance while using drop-in safes has the lowest cost for SAR, it is a rather ambiguous process due to clustering of employees. The final selection of alternatives by Kappe' and SAR has been done based, mainly, on total costs of cash handling¹. Other success criteria have been accounted for only modestly. Charts 19 and 20 show the total costs of different alternatives for Kappe' and SAR.

¹ Total costs of cash handling= staff costs + fees paid to bank/ Cit company +machine costs (+rent of joint cash office)

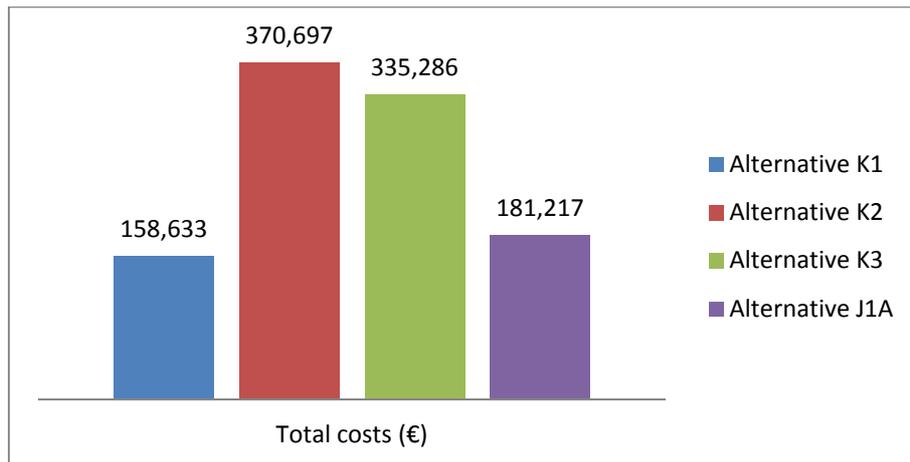


Chart 19: Total costs of different alternatives for Kappe'

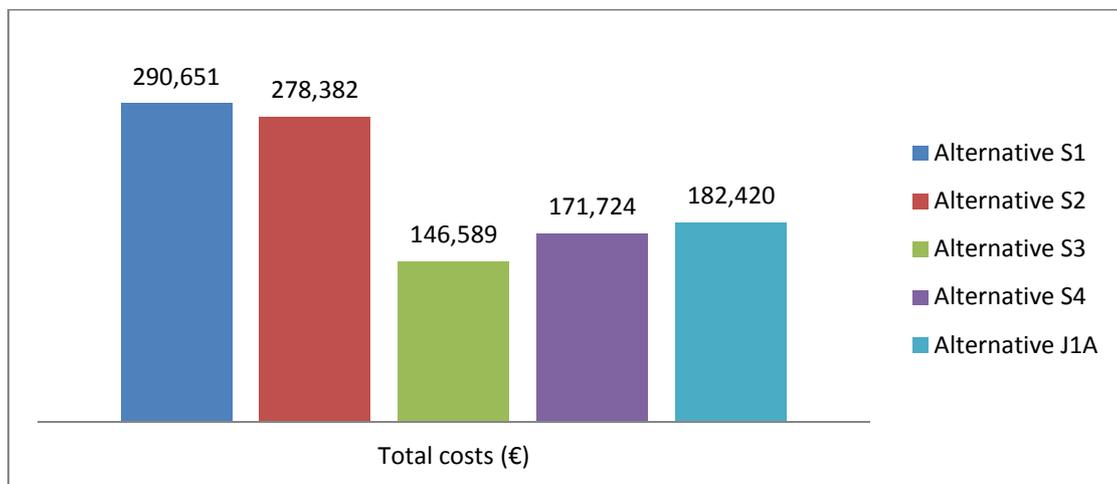


Chart 20: Total costs of different alternatives for SAR

As it can be seen in Charts 19 and 20, the least costly alternatives are K1 for Kappe' and S3 for SAR (using cash recycling machines separately), followed by J1A (joint collaboration in using cash recycling machines). Despite large cost savings in alternative S4 (using drop-in safes), due to low transparency of the process, it is not considered a suitable choice by SAR. Alternative J2 is disregarded by both companies since there is no indication of other retailers' willingness to join Kappe' and SAR. Furthermore, as shown in analyses, it is expected to cause administrative complications and little/no additional cost savings. Alternative J3 imposes costs of renting of two separate back offices without the possibility of sharing all machines to reduce technology costs. Moreover, rent fees and internal costs (staff costs) are excluded from the calculations. Therefore, there is no clear estimate of the total costs to be incurred by Kappe' and SAR.

Given the total costs and the aforementioned reasons, the final decision has to be made between the separate and joint alternatives with application of cash recycling machines (i.e. selection of K1 by Kappe' and S3 by SAR as opposed to selection of J1A by both companies). Before implementation is done, it is a good idea to once again the number of machines as determined before. These are revised in Table 51.

Table 21: Comparing number of recycling machines in alternatives K1, S3, and J1A

	Separate alternative		Joint alternative for Kappe' and SAR (J1A)
	Kappe' (K1)	SAR (S3)	
Loune1	1	1	1
Lounge 2	1	1	2
Lounges 3&4	1	1	2

As it can be seen, collaboration in lounges 2, 3 and 4 would be done with the same total number of machines as when cash handling is done separately by Kappe' and SAR. Therefore, the technology costs would be equal irrespective of the selected alternative. On the other hand, in the joint alternative, additional costs of a joint cash office would be incurred and administrative tasks would become more complex. With attention for pros and cons of a joint alternative managers of Kappe' and SAR have decided to adopt the separate solution for lounges 2, 3 and 4.

In lounge 1, if the companies worked separately each would need to pay for one machine whereas in a joint cash handling process only 1 machine would suffice. Hence, technology costs for lounge 1 would be lower in the joint alternative. However, working together requires sharing a cash office and dividing administrative tasks which would in turn result in lower transparency. Therefore, a choice needs to be made between:

1. Joint use of cash recycling machines in lounge 1 and separate use of cash recycling machines in the other lounges
2. Separate use of cash recycling machines in lounge 1 as well as the other lounges

The following calculations are an effort to find the answer to this question.

1.1.1. Joint use of cash recycling machines in lounge 1 and separate use of cash recycling machines in the other lounges (J1B^I)

In this lounge Kappe' and SAR have 31% and 69% of transactions respectively. Therefore, joint costs^{II} should be divided accordingly. Table 52 shows costs of different categories and total costs for this case.

^I Note that J1B is similar to J1A in terms of number of cash recycling machines in each lounge, but differs in the sense that it suggests collaboration in cash handling only in lounge 1.

^{II} Joint costs include wages paid of cash office manager, ABN-AMRO fees, machine costs, and joint cash office rent.

Table 22: Joint use of cash recycling machines in lounge 1

Cost category	Cost driver	Kappe'		SAR	
		Cost driver amount/ number	Cost (€)	Cost driver amount/ number	Cost (€)
Staffs' cash handling tasks	Annual time (hours per year)	2,640	66,405	1,854	60,577
ABN-AMRO fees (excluding coin orders and compensation)	Euro seal bags	391	1,271	871	2,831
	Foreign seal bags	270	878	602	1,957
Technology costs	Number of machines	1 shared	3,923	1 shared	8,727
Joint cash office rent	Shared office area (sq. m)	12	2,233	12	4,967
Total (excluding coin orders and compensation)			74,710		79,059

As shown in separate alternatives for Kappe' and SAR, if the two companies start working separately in lounges 2 and 3, each of them needs one set of recycling machines in each lounge. Table 53 shows the cost drivers in this case.

Table 23: Separate use of cash recycling machines in the lounges 2 and 3

Cost category	Cost driver	Cost driver amount/ number	
		Kappe'	SAR
Staffs' cash handling tasks	Annual time (hours per year)	5,013	3,223
ABN-AMRO fees (excluding coin orders and compensation)	Euro seal bags	1,825	599
	Foreign seal bags	1,262	414
Technology costs	Number of machines	2 separate	2 separate
Joint cash office rent	Shared office area (sq. m)	-	-

Costs for Kappe' and SAR have been calculated and presented in Table 54 and Table 55, respectively.

Table 24: ABC for Kappe' for alternative J1B

Cost category	Cost (€)	cost per transaction (€)	cost per Euro of transaction (€)	share in total costs	Percentage change compared to current situation
Staffs' cash handling tasks	197,729	0.28	0.0277	136%	-31%
ABN-AMRO fees ^I (after compensation)	-87,361	-0.12	-0.0122	-60%	-2081%
Technology costs	33,080	0.05	0.0046	23%	36%
Joint cash office rent	2,233	0.00	0.0003	2%	2233
Total (after compensation)	145,681	0.20	0.0204	100%	-54%

Table 25: ABC for SAR for alternative J1B

Cost category	Cost (€)	Cost per transaction (€)	Cost per Euro of transaction (€)	Share in total costs	Percentage change compared to current situation
Staffs' cash handling tasks	164,001	0.09	0.0041	111%	-28%
ABN-AMRO fees ^{II} (after compensation)	-59,121	-0.03	-0.0015	-40%	-164%
Technology costs	37,884	0.02	0.0009	26%	
Joint cash office rent	4,967	0.00	0.0001	3%	
Total (after compensation)	147,732	0.08	0.0037	100%	-54%

1.1.2. Comparison between J1B, and K1 and S3

Table 56 allows a comparison between total costs of separate alternatives and joint only in lounge 1 for Kappe' and SAR.

Table 26: Comparison between J1B, and K1 and S3

Cost category	Costs for Kappe'(€)		Costs for SAR(€)	
	Alternative J1B	Alternative K1	Alternative J1B	Alternative S3
Staffs' cash handling tasks	197,729	204,184	164,001	159,824
ABN-AMRO fees (after compensation)	-87,361	-87,358	-59,121	-55,042
Machines	33,080	41,807	37,884	41,807
Joint cash office rent	2,233	-	4,967	-
Total costs (after compensation)	145,681	158,633	147,732	146,589

^I Including coin orders

^{II} Including coin orders

As it can be seen in the table above, inequality of share of companies in transactions in lounge 1 results in different levels of cost saving for Kappe' and SAR (€12,952 more saving for Kappe' compared to K1 as opposed to €1,1143 less saving for SAR compared to S3). Hence, if the basis for cost distribution between companies is share in total transactions, alternative J1B might be favoured by Kappe', but not SAR. It should be noted that the companies can reach an agreement on this issue (e.g. Kappe' compensates SAR for lower saving through J1B). However, this alternative results in differences in processes in lounges (i.e. joint cash handling in lounge 1 and separate in other lounges). Consequently, Kappe' and SAR prefer not to select this alternative to avoid such a discrepancy. Moreover, due to complications of administration in a joint process it is recommended for Kappe' and SAR to work separately in lounge 1 similar to the other lounges.

1.2. Implementation

Change is a common thread among companies. New solutions or procedures once assessed are compared and the appropriate one is selected based on the relevant criteria. The next step would be implementation of the chosen solution. The ultimate success of these solutions is indebted to proper change management and a structured implementation plan. This holds also for the cash handling solutions selected by Kappe' and SAR. The purpose of this section is to provide general guidelines for implementation of the selected alternatives. It can be used by Kappe' and SAR to compare their approaches to implementation with Change Model and trace the potential deficiencies. This cornerstone model was developed in the 1940s by Kurt Lewin for managing organizational changes.⁶ It states that successful implementation of a change involves three steps:

1. **Unfreeze:** discarding (unlearning) old behaviours and methods, and destabilizing (unfreezing) the existing quasi-stationary equilibriums to create motivation and preparation for change
2. **Change (or moving):** identifying, evaluating, and adopting a new solution
3. **Refreeze:** stabilizing a new quasi-stationary equilibrium to safeguard the new solution from regression⁴⁴

Shifting from the current systems to the new one in these steps can reduce potential resistance, conflict, or failure. A number of activities need to be carried out in each step. These are explained below.

Unfreeze

Preparing the organization and the involved staff for breaking the status quo is a necessary prerequisite for introducing a new solution. In this regard, Kotter and Klein emphasized the importance of creation of a sense of urgency and communication of plans. Therefore, it is needed to pay attention to different stakeholders.

Given their criticality the stakeholders should be involved in the process (see Appendix 2). Support of Schiphol Group needs to be ascertained. In addition, employees and store supervisors need to be informed of the upcoming change in the cash handling process. Explaining the advantages of the new system compared to the current system will reduce resistance to change by creating an emotionally calm environment for employees.⁴⁵

Informing ABN-AMRO and GWK Travelex of the effect of changes in advance of implementation, can provide sufficient time for negotiations which may result in even more cost savings than estimated for separate alternatives for Kappe' and SAR. Overall, re-examining the current procedures helps "effectively create a (controlled) crisis, which in turn can build a strong motivation to seek out a new equilibrium".⁶

Change

Once a sense of urgency for change is created and the status quo is destabilized, the required measures can be taken to adopt the new solution. These measures are as follows.

1. **Prepare the infrastructure:** Any hardware used in the current systems which is not needed for the new system needs to be decided upon and prepared for removal. The provider of new hardware and software needs to be contacted so that agreement is reached and purchasing arrangements are made.
2. **Coordinate with the organizations involved in implementation:** Communication with staffs initiated in the unfreezing step, needs to be continued. Moreover, arrangements need to be made with ABN-AMRO about the frequency of delivery of change, and provision of reports of deposited amounts.
3. **Implement initial training:** It is required for both employees and supervisors to attend general coaching sessions with major instructions. As the infrastructure is being prepared for installation, supervisors should also be trained about the new procedures and their tasks with regards to ordering and handling change, monitoring transactions of employees, skimming the machines and investigating discrepancies.
4. **Install the production solution, convert the data, and Perform final verification in production:** Unnecessary hardware must be removed from the cash offices. Then purchased cash recycling machines should be placed in the selected locations in each lounge. Required arrangements for the cash machine should be made. For instance with attention for the share of each currency in transactions of each lounge, the escrows on the machines must be organized. After that, software needs to be configured and prepared for use. In case of differences in data formats, they should be converted to suit the new system.
5. **Implement new processes and procedures:** Once installation, data conversion and verification is finalized the new system can be rolled out. It is possible for Kappe' and especially SAR to start using the new system firstly in only one lounge. After confidence is achieved in proper functioning, the implementation can be completed by rolling out the solution in the other lounges as well.
6. **Implement on-the-site training:** Apart from general training sessions and training of supervisors, it is important to familiarized employees with using cash recycling machines. This can be done by having a supervisor assist individual employees in withdrawing and depositing money at the start and end of their shifts for a proper period of time (depending on the number of employees and their speed of learning).

Employees should be taught to cooperate with each other. One example is in providing additional change during the shifts. Employees can contact someone who is going to start working shortly to take along their needed change. In this way, they can save time, and the availability rate for customer service will be improved.

Refreeze

Once the change has been completed, it is crucial to monitor the functioning of the solution. It must be ensured that the change is internalized and incorporated into everyday business.⁴⁶ As a part of monitoring, on-the-site training should be continued until it can be claimed with certainty that all employees know how to use the machines. At that point, this training can be stopped.

It is of major importance to sustain the new system of cash handling by establishing feedback loops. The new process should be constantly re-evaluated and necessary improvements should be made through

- ❖ Providing (and later revising) procedural guidelines for
 - Carrying out cash handling activities at different times during the day
 - Handling technical issues such as machine breakdowns
 - Maintaining the security of procedures and dealing with robbery and cash shrinkage
 - documentation of collections and deposits, and tracking of cash
 - Segregation of duties for clarity in roles and responsibilities to achieve a transparent⁴⁷ (see Table 85 for division of tasks)
- ❖ Establishing proper ways and channels of communication between
- ❖ Employees with each other
 - Employees and store supervisor
 - Store supervisor and the bank
 - Store supervisor and company officials (department of finance and/or security)

The implementation steps are summarized in Figure 33. The system will operate as shown in Figures 12 and 13 in chapter 3.

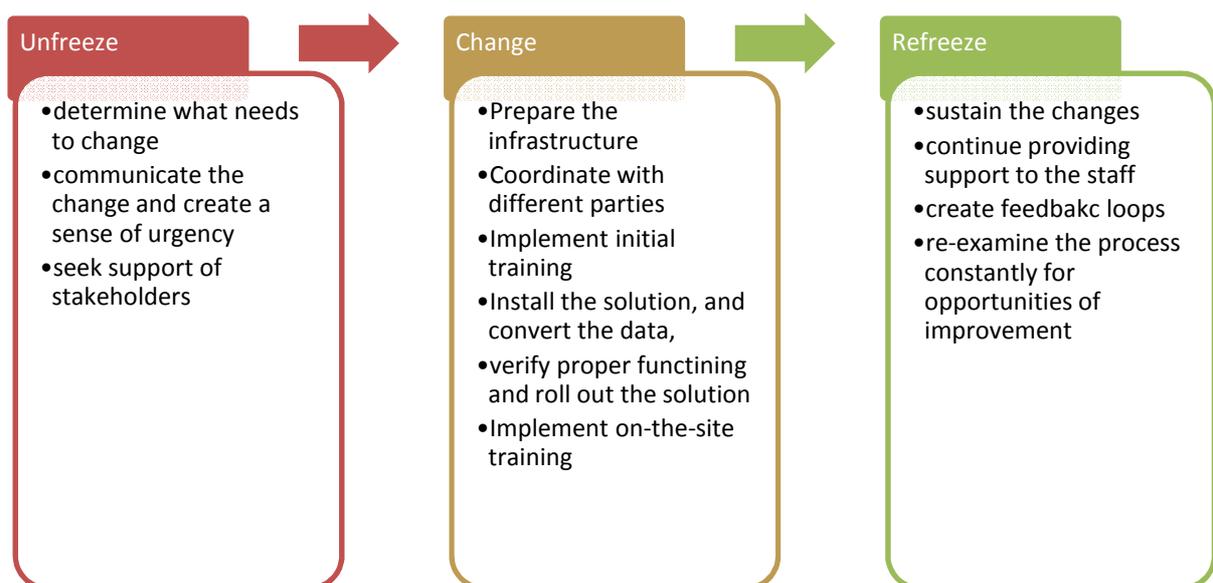


Figure 29: Implementation steps

Summation

In this chapter, the cash handling processes proposed in chapter 6 were compared and the selection among them was made based, mainly, on total costs. The alternative selected by both Kappe' and SAR was independent use of cash recycling machines and signing a contract with ABN-AMRO. The implementation steps were explained using Lewin's change model in order to successfully prepare for, adopt and maintain an efficient process.

Chapter 8 will focus on testing the prudence of the selected processes.

Chapter 8: Reassessment of choices

This chapter will be dedicated to the final research question to be answered which is "How might Kappe' and SAR's choice of alternative change in the future?" This question consists of two sub-questions:

- How would the alternatives be ranked for Kappe' and SAR with a multi-criteria decision making approach?
- How would the trends in share of cash as a payment instrument influence Kappe' and SAR's decision with regards to the suitable alternative?

To answer the first sub-question AHP methodology will be used to find the best cash handling process for Kappe' and SAR. The results will then be compared with the alternatives selected by Kappe' and SAR to be selected as discussed in chapter 6.

Answering the second sub-question requires looking at expected trends in cash payments. Investigation of these trends, as mentioned previously, is not part of this research and has been done in another research done in parallel. However, the outcomes of that research will be used as an input to test the impact of cash trends on costs of cash handling in the proposed alternatives. In this manner, it can be decided whether the selected alternatives would remain favourable in the coming years.

Figure 34 shows the focus of chapter 8 as part of the research.

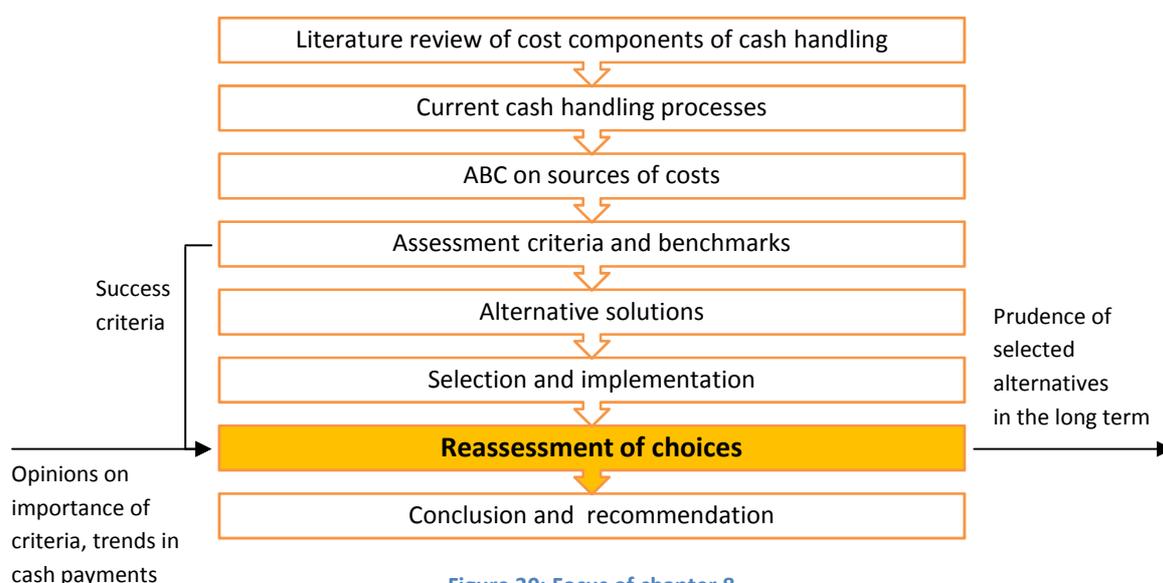


Figure 30: Focus of chapter 8

8.1. Multi-Criteria Decision Making: an AHP methodology

"Multi-criteria decision making (MCDM) refers to making decisions in the presence of multiple, usually conflicting, criteria".² One of the methods used in MCDM is Analytic Hierarchy Process (AHP). AHP was developed by Saaty in 1970th. In this method, numerical pair-wise comparisons between criteria are used to derive the priority vector. The different alternatives are then assessed on the criteria and finally an overall ranking of them is attained.³ This approach "organizes tangible and intangible factors in a systematic way, and provides a structured yet relatively simple solution to the decision-making problems".^{4,5}

Multi-Criteria Evaluation has been considered a fundamental step in many rational decision making processes. Such an evaluation will provide insight into strengths, weaknesses and overall utility of different options.

8.1.1. Applications of AHP

Due to the inherent trade-off between different factors decision making in environmental projects is complex and intractable. The process entails accounting for several criteria some of which cannot be easily quantified. Conflicts in stakeholders' preferences might also arise. Research in the area of multi-criteria decision analysis (MCDA) has led to practical methods for applying scientific decision theoretical approaches to complex multi-criteria problems. Some of the applications of AHP as a MCDA tool, has been in prioritization of alternatives and selection of remedial technologies.⁴⁸

AHP has been used to structure and clarify "the relations and importance between human performance improvement and the style of management". It helps assess relevant criteria critically and logically to assist in making sensible decisions.⁴⁹ It has also been applied in determining the relative weights of evaluation criteria in a multi-criteria decision making (MCDM) approach to assess the mobile phone options in respect to the users' preferences order.⁵⁰ Furthermore, there is evidence of application of AHP for selecting a multi-media authorization system (MAS) by identifying and ranking of products with attention for perspective og group members.⁵¹

Albeit Kappe' and SAR are mainly concerned with costs of cash handling, they also have an interest in some other criteria. Recall from chapter 4 the success criteria derived:

- A. Costs
- B. Available time for core activities of employees
- C. Risks and potential security issues involved in a process
- D. Ease, transparency and uniformity of the process at different shops

Considering the involvement of several parties in the decision making process and its strategic significance, a Multi-Criteria Decision Making method allows Kappe' and SAR to revise prioritizing judgments at a later stage and update their decisions as new circumstances arise.

Generally, a Multi-Criteria Evaluation consists of

- multiple alternatives (alternative solutions for cash handling in the study at hand)
- multiple criteria (criteria of importance for different stakeholders in the case at hand as discussed before),and

- multiple evaluators (different people directly involved in the cash handling processes of Kappe' and SAR or appointed as supervisors).⁵²

Here, Analytic Hierarchy Process (AHP) will be used as in order to incorporate the four success criteria into the decision making process for Kappe' and SAR.

8.1.2. AHP methodology: calculation steps

Step 1: The decision problem is decomposed into a hierarchy with a goal on top, criteria (and sub-criteria if any) at the levels, and decision alternatives at the bottom. The criteria are shown in figure and briefly explained below.

A. costs

Costs used in multi-criteria assessment are non-staff costs (i.e. they include bank/ CiT Company fees, technology costs, and rent costs of joint cash office, if any, while they exclude employee and administrative wages). Availability rate for customer service is calculated based on the amount of time employees spend on cash handling tasks. Accordingly, using the corresponding costs in the first criteria would result in conflict of criteria.² Furthermore, the total working hours of staff remain the same irrespective of the internal costs¹. This means the total employee wages (for all tasks including cash handling and sales tasks) would be equal in the current systems and suggested alternatives and employee costs are not an additional expense category in general. It is needless to say that the goal of efficiency of cash handling is highly reliant on lower costs.

B. Availability rate for customer service

For each alternative, availability rate for customer service is equal to

$$1 - \frac{\text{average time spent on cash handling tasks by each employee in each shift}}{\text{total working time of each employee in each shift}}$$

The larger the availability rate for customer service, the better the alternative is with regards to the second success criteria.

C. Risks

To quantify the risks as part of the AHP methodology, the risk assessment of alternatives have been used. Numbers 1,2 and 3 have been assigned to risk ratings of L (Low), M (Medium), and H (High) for each of the risks in a given alternative. Then an average of these numbers has been used as the overall risk of the alternative to be used as the input for AHP methodology. A larger risk number has a negative implication.

D. Transparency and uniformity

In a transparent cash handling process, tasks and roles are clearly defined, the amounts handled can be known for each individual employee, and there are little possibilities for cash shrinkage. If the same cash handling process is used for all stores of one company, it is possible to rotate the employees across stores without having them undergo additional training to work in different

¹ Internal costs of cash handling are the costs incurred due to the time spent on cash handling tasks by employees and administrative staff.

systems. Given the level of transparency and uniformity of suggested alternatives, numbers 1, 2 and 3 are assigned to them. A larger number is a representative of a better solution in terms of the fourth success criteria.

Step 2: A pair wise comparison between the criteria is done between the criteria using Saaty's nine-point scaleⁱ. The decision matrixⁱⁱ can be completed based on these numbers. The pair-wise comparison should be done also for the next level of criteria (if any). For the complete description of Saaty's scale see Appendix 6.

Step 3: The weights for the criteria (and sub-criteria) should be calculated as explained in Appendix 6.

Step 4: The inconsistency index should be calculated using

$$CI = \frac{\lambda_{max} - N}{N - 1}$$

This shows how consistent the decision maker's judgments in the evaluations are. A CI close to zero indicates a consistent assessment. If CI is smaller than 0.1 AHP results are considered consistent. Consistency ratio is equal to

$$CR = \frac{CI}{CI_R}$$

CI_R is the corresponding index of consistency for random judgements shown in the second row of Figure 35. The upper row is the order of the random matrix.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0.00	0.00	0.58	0.90	1.12	1.24	1.32	1.41	1.45	1.49	1.51	1.48	1.56	1.57	1.59

Figure 31 :CI_R⁴⁹

A higher consistency ratio reflects the randomness in and thereby untrustworthiness of the assessment and calls for reconsideration of assessment.

Step 5: Similarly, pair-wise comparisons need to be carried out for alternatives with respect to each criteria and the corresponding consistency ratios must be calculated.

Step 6: The product of local weight of each individual alternative with respect to each criteria must be calculated and then summed up with the other product results. In this manner, the overall ranking of alternatives can be attained.⁴⁹

The comparison matrix has been completed by a person from each company to reflect the priorities. This would be the input for the AHP model to derive the weights for criteria A, B, C and D from the perspective of each company.

ⁱ In Saaty's nine-point scale Numbers 1 to 9 are used to indicate the intensity of importance of one criterion over another.

ⁱⁱ Decision matrix is an n*n matrix in which n is the number of criteria

Once developed, each alternative will be assessed on the four major criteria. Then, the assigned weights will be used to compare the alternatives for each company with regard to each criterion and also on the whole.

Note that in the case at hand, in order to select the most efficient cash handling alternative as the goal of the hierarchy, criteria A and C must be at their minimum while criteria B and D need to be at a maximum. Thus, negative signs need to be used for A and C in overall calculations.²

8.1.3. Reassessment of Kappe's choice based on AHP results

Table 57 provides an overview of different alternatives proposed for Kappe’.

Table 27: Overview of different alternatives for Kappe’

	A	B	C	D
Alternative K1	-45,551	97.92%	1.8	3
Alternative K2	116,597	96.38%	1.2	2
Alternative K3	133,997	97.92%	1.5	3
Alternative J1A	-33,876	97.82%	1.8	3

Table 58 shows the pair-wise comparisons of criteria done by a representative of Kappe’.

Table 28: Pair-wise comparison of criteria for Kappe¹

	A	B	C	D
A	1	6	5	5
B	1/6	1	2	3
C	1/5	1/2	1	1
D	1/5	1/3	1	1

Using AHP algorithm, Eigen vectors for alternatives can be calculated which lead to weights shown in Table 59. The consistency ratio is an acceptable 8%.

Table 29: AHP results for Kappe’

	A	B	C	D	Total	Ranking
Assigned weights	0.63	0.18	0.10	0.09	-	-
Alternative K1	-0.2661	0.2511	0.2857	0.2727	0.20882	1
Alternative K2	0.6812	0.2471	0.1905	0.1818	-0.38735	3
Alternative K3	0.7828	0.2511	0.2381	0.2727	-0.44726	4
Alternative J1A	-0.1979	0.2508	0.2857	0.2727	0.165799	2

¹ The number in each cell represents the importance of corresponding row over the corresponding column. If the corresponding row is less significant the inverse number should be used.

Conclusion

By looking at the ranking of alternatives, it can be seen that alternative K1 (using 3 cash recycling machines and working with ABN-AMRO) is the best choice for Kappe' with attention for not only costs, but also availability rate of employees for customer service, risks and transparency of the process. This evidence substantiates the properness of the alternative selected by Kappe' to be implemented.

8.1.4. Reassessment of SAR's choice based on AHP results

Table 60 provides an overview of different alternatives proposed for SAR.

Table 30: Overview of different alternatives proposed for SAR

	A	B	C	D
Alternative S1	133,807	98.34%	1.4	3
Alternative S2	7,534	93.30%	1.5	3
Alternative S3	-13,235	98.34%	1.8	3
Alternative S4	100,620	99.12%	1.5	1
Alternative J1A	-1,560	97.82%	1.8	3

Table 61 shows the pair-wise comparisons of criteria done by a representative of SAR.

Table 31: Pair-wise comparison of criteria for SAR

	A	B	C	D
A	1	5	8	9
B	1/5	1	5	3
C	1/8	1/5	1	1/3
D	1/9	1/3	3	1

Eigen vectors for alternatives and then weights have been calculated and are shown in Table 62. The consistency ratio is 8% which is an acceptable number.

Table 32: AHP results for SAR

	A	B	C	D	Total	ranking
Assigned weights	0.66	0.20	0.05	0.09	-	-
Alternative S1	-0.3645	0.2815	-0.2961	0.3514	-0.1675	5
Alternative S2	-0.2273	0.2246	-0.2443	0.2703	-0.0930	4
Alternative S3	-0.1988	0.1707	-0.1888	0.1892	-0.0895	3
Alternative S4	-0.1462	0.1636	-0.1221	0.1081	-0.0602	2
Alternative J1A	-0.0631	0.1596	-0.1487	0.0811	-0.0099	1

Conclusion

By looking at the ranking of alternatives, it can be seen that joint cash handling and then use of drop-in safes are the first and second preferred alternatives. This indicates that these alternatives might

have been preferred by SAR if all the criteria were accounted for in choosing between alternatives. Kappe's preference for separate cash handling process and the complications of joint cash handling justifies the fact that SAR did not select a joint cash handling process. On the other hand, although using drop-in safes imposes relatively low costs, it is a rather old fashioned process with lower transparency than favoured by SAR. Consequently, it can be claimed that selection of alternative 3 (using 3 cash recycling machines and working with ABN-AMRO) is the right decision.

8.2. Cash trends and their effect on selection of the proper alternative

By looking at quantitative cost estimates and qualitative analyses of different alternatives, K1 and S3 (using 3 cash recycling machines and working with ABN-AMRO) were selected by representatives of Kappe' and SAR to be implemented. However, changes in some factors in the future might call for a revision of decision made. In other words, the selected solutions might no longer be considered suitable in the future.

One inevitable change is the trend in use of cash as a payment method by customers. Since use of electronic payment methods has been becoming more common among people, there is uncertainty whether the selected solution would be still considered appropriate in the coming years.

To ensure the properness of the method, it is firstly required to forecast the trends in cash payments. An increasing trend, justifies large investments in cash handling to achieve more efficiency, while in case of a decreasing trend it might be wiser to make more incremental improvements in the processes. Also, the effect of trends on the costs pattern over the coming years should be taken into consideration to ascertain that the change in cash payments will not lead to more cost efficiency of a different alternative after a few years. For this purpose, the costs of different alternatives in the coming years should be estimated based the cash trends. A comparison between these costs clarifies whether the selected solution would be still considered suitable if the use of cash changes.

8.2.1. Reassessment of Kappe's choice based on cash trends

The forecasts of cash payments for Kappe' are shown in Chart 21.¹

¹ This has been done in a separate thesis done by Baris Ozkale.

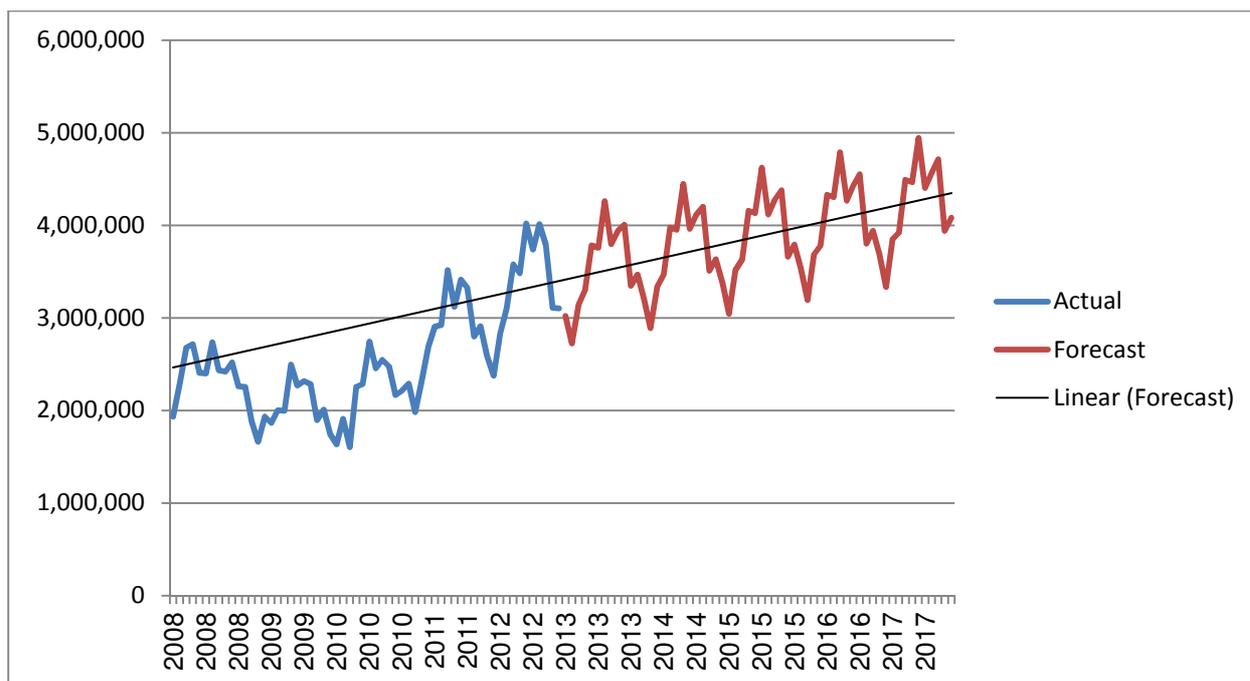


Chart 21: Forecast of trends in cash payments for Kappe'⁵³

As it can be seen, the trend for use of cash at Kappe' is a growing one. The cost pools that may be affected by the increase in use of cash include time required for cash handling and administration, and fees paid to ABN-AMRO or GWK-Travellex. Table 63 shows the cost pools that would be affected in each alternative if use of cash changes according to chart.

Table 33: Impact of trends in cash payments on cost categories for Kappe'

	Current system	Alternative K1	Alternative K2	Alternative K3	Alternative J1A
start					
end	✓		✓		
during					
administration	✓	✓	✓	✓	✓
fees	✓	✓	✓	✓	✓

Based on the possible changes in cost categories costs of different alternatives have been estimated for the coming years. Table 64 shows the estimations for the total costs of proposed alternatives.

Table 34: Costs of different alternatives for Kappe' with the impact of trends in cash payments

Year	Cost of alternative (€)				
	Current system	Alternative K1	Alternative K2	Alternative K3	Alternative J1A
2013	315,513	158,633	370,697	335,286	181,217
2014	320,922	154,462	412,882	342,778	176,452
2015	326,218	150,369	422,128	346,971	171,776
2016	331,162	146,562	430,741	350,860	167,427
2017	335,892	142,882	439,001	354,584	163,223

Chart 22 depicts the trends in cash payments and the concomitant changes in costs of different alternative processes for Kappe'.

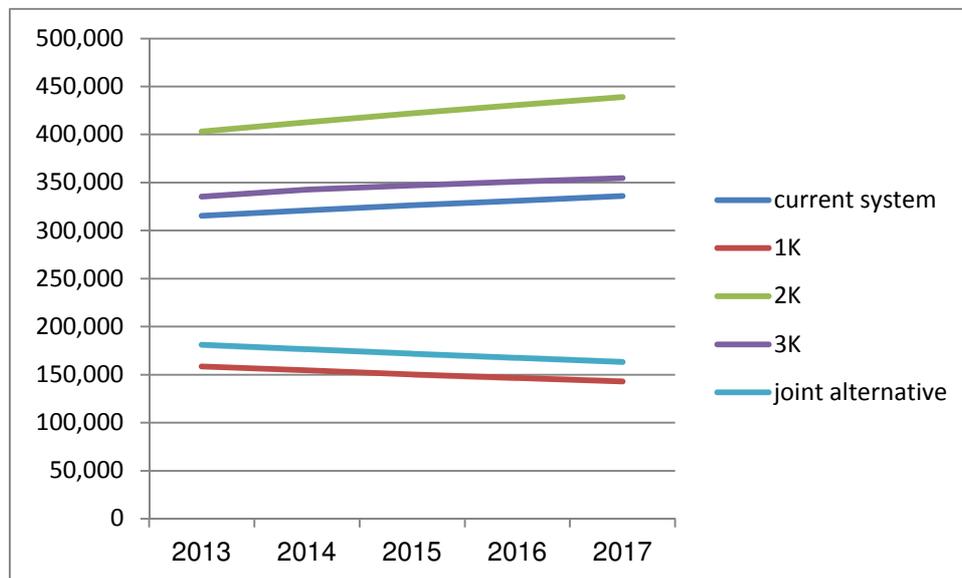


Chart 22: Costs of different alternatives for Kappe' with the impact of trends in cash payments

Conclusion

Chart shows that not only alternative K1 (i.e. separate use of 3 cash recycling machines) is less costly than the other alternatives, it will remain the least costly alternative for Kappe' in the coming years. This can be mainly attributed to the growth in the amount of foreign currencies as a result of rising cash trends which would be followed by a larger compensation received from ABN-AMRO. The magnitude of growth in compensation would compensate for the increase in costs of administration (due to more skimming) and costs of seal bags (caused by more deposited seal bags).

A comparison between costs of S3 with other alternatives shows that while the expected increase in The forecasted trend for use of cash is expected to enlarge the costs of alternatives K2 and K3 and the current system. Costs for the joint alternative will fall at a rate close to that of alternative K1. However, this alternative will still be more costly for Kappe' in the next few years. It can be concluded that given the trends in cash payments, the selected alternative by Kappe' is a sensible choice.

8.2.2. Reassessment of SAR's choice based on cash trends

The forecasts of cash payments for SAR are shown in Chart 23.¹

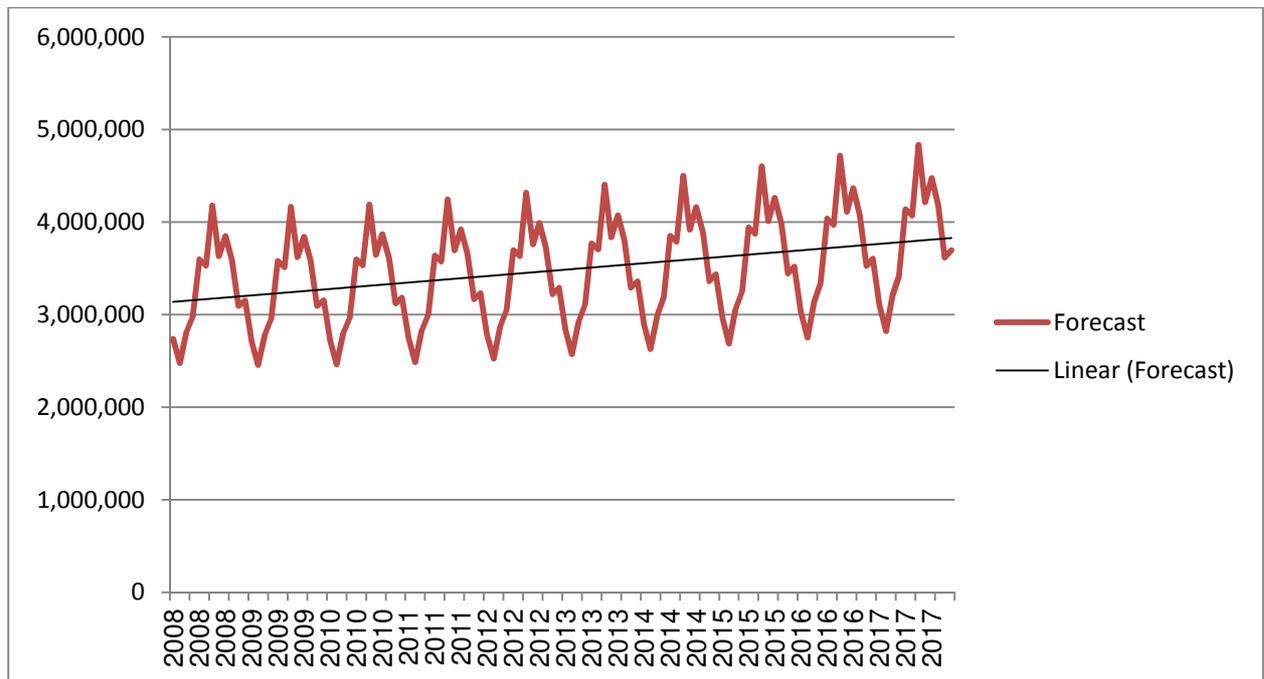


Chart 23: Forecast of trends in cash payments for SAR⁵³

As it can be seen, the use of cash at SAR is expected to grow in the coming years. The increase in use of cash can affect some of the cost pools of different alternatives namely time required for cash handling and fees paid to ABN-AMRO or GWK-Travellex. In Table 65, the cost pools that would be affected in each alternative are indicated with a check mark.

Table 35: Impact of trends in cash payments on cost categories for SAR

	Current system	Alternative S1	Alternative S2	Alternative S3	Alternative S4	Alternative J1A
start						
end	✓					
during						
administration		✓		✓		✓
fees	✓	✓	✓	✓	✓	✓

With attention for the change in cost categories in different alternatives, their costs have been estimated for the coming years. Table 66 shows the expected change in the total costs of proposed alternatives as a result of trends in cash payments.

¹ Similar to Kappe', this has been done in a separate thesis done by Baris Ozkale.

Table 36: Costs of different alternatives for SAR with the impact of trends in cash payments

Year	Cost of alternative (€)					
	Current system	Alternative S1	Alternative S2	Alternative S3	Alternative S4	Alternative J1A
2013	321,952	290,651	278,382	146,589	171,724	182,420
2014	327,573	292,919	278,393	145,514	173,502	181,082
2015	333,580	295,233	278,406	144,360	175,403	179,646
2016	339,991	297,754	278,419	143,121	177,431	178,105
2017	346,830	300,488	278,434	141,823	179,594	176,489

The trends in cash payments and the concomitant changes in costs of different alternative processes for SAR are depicted in Chart 24.

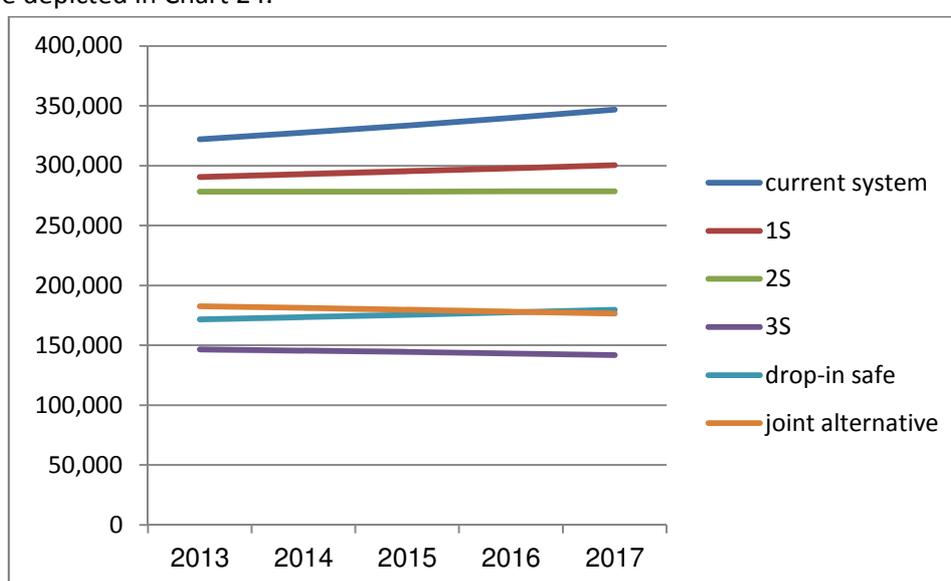


Chart 24: Costs of different alternatives for SAR with the impact of trends in cash payments

Conclusion

As it can be seen for alternative S3 not only the total cost is lower than the other alternatives at the moment, but also it is going to decrease despite the growth in cash payments. This can be explained by paying attention to the effect of cash trends especially on the amount of foreign currencies. The increase in use of cash is expected to increase the foreign currencies deposited and this in turn would result in a higher compensation received from ABN-AMRO. This compensation would offset the increase in costs of administration (due to more skimming) and costs of seal bags (caused by more deposited seal bags).

A comparison between costs of S3 with other alternatives shows that while the expected increase in use of cash leads to a growing fall, the costs of other alternatives would rise or remain constant. Therefore, it can be concluded that given the expected trend in cash payments, alternative S3 is still the proper choice for SAR. It can be concluded that alternative S3 (the selected alternative by SAR) is a prudent choice considering the trends in cash payments.

Summation

In this chapter two tools were used to re-evaluate the cash handling processes selected by Kappe' and SAR. Firstly, Analytic Hierarchy Process helped rank the alternatives proposed in chapter 6 and compare the top processes with Kappe' and SAR's choice. The results confirmed the selection of alternative K1 for Kappe'. For SAR, it was found that alternatives J1A and S4 might be preferred over the selected alternative (S3). However, given the administrative complications of J1A and the low transparency of alternative S4, it is justifiable that alternative S3 has been selected for implementation.

In the next step, based on forecasts of customers' cash payments in the coming years, it was tested whether the trends in these payments, would justify the application of a different cash handling process for each retailer than that currently selected for implementation. The findings of both tools have confirmed that a sensible decision has been made by Kappe' and SAR with regards to the proper cash handling process to be adopted.

Chapter 9: Conclusions, recommendations, and reflection

This section consists of the overall conclusions and recommendations which follow from the research. The conclusions of this research summarized the findings to provide an answer to the research questions specified in the first chapter. Recommendations focus on possibilities of further research on cash handling processes at Amsterdam Airport Schiphol. Finally, the approach and methodologies used will be revised and their effectiveness in answering the research questions will be evaluated. Figure 36 shows the focus of chapter 9 as the final part of the research.

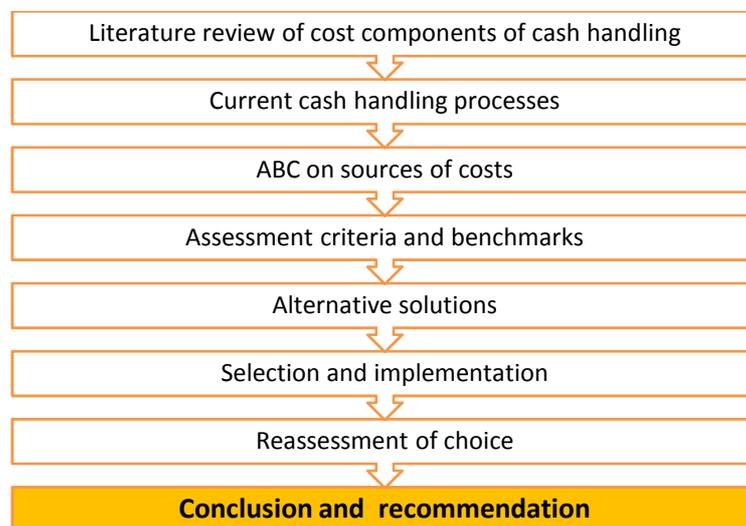


Figure 32: Focus of chapter 9

9.1. Conclusion

In this research current cash handling processes at Kappe' and SAR were investigated and the sources of costs were identified. In Kappe's old system, due to significant reliance on staff for cash handling, this category has a share of 84% in total costs. In Kappe's new system thanks to use of cash recycling machines less time needs to expended by staff on cash handling tasks In addition the number of seal bags and fees paid to ABN-AMRO is reduced (note that because of compensation by ABN-AMRO fees paid are negative). The total costs of cash handling for Kappe' are €316k which is equivalent to €0.0078 per Euro transaction. At SAR, similar to Kappe's old system, manual cash handling results in a 71% share of staff in cash handling and a total cost of €322k. This corresponds to €0.0080 per Euro of transaction.

In the next step of the research, success criteria were derived based on stakeholders' interests and criticality of involvement. These include: costs, availability of employees for customer service, risks, and transparency ad uniformity in the cash handling process. In addition, organizational and

technological benchmarks were defined by observing successful cash handling processes of other retailers.

Using the acquired insight, alternative cash handling processes were developed and compared. Since Kappe' and SAR have a major interest in cost savings, they have decided to, separately, use one set of cash recycling machines in each lounge (alternatives K1 and S3). Implementation of these alternatives is expected to lead to 50% cost saving for Kappe' (total cost of €159k) and 54% cost saving for SAR (total cost of €147k). The possibility of a joint cash handling process was assessed in three alternatives (J1, J2, and J3). However, they are not considered favourable by representatives of Kappe' and SAR. The reasons for this included additional costs imposed on companies (including joint cash office costs and wages of cash office manager), organizational complications, uncertainty about other retailers' willingness to join, and ambiguity of total costs.

As mentioned above, the selection was done almost merely based on cost estimates of different cash handling processes. Therefore, it was essential to revise the choices with attention for important factors and test their effect. To this purpose, firstly Analytic Hierarchy Process was used to find the ultimate best alternative for each company. The results confirmed Kappe's choice of alternative K1 (using cash recycling machines independently from SAR). As for SAR, alternatives S4 (using drop-in safes) and J1A (joint cash handling) were the first two recommendable alternatives. However, due respectively, to ambiguity and complication of these processes, it is justifiable for SAR to have opted alternative S3 (using cash recycling machines independently from Kappe').

The other factor that demanded reassessment of choices was the trends in customer cash payments and their effects on the total costs of cash handling processes. Costs of the proposed alternatives under the expected circumstances were estimated. They indicated that for both Kappe' and SAR, the selected processes (K1 and S3) are the least costly and will remain so in the coming years. This confirms that choices are plausible not only at this time, but also in the long run.

9.2. Recommendation

It is possible for the priority of success criteria (or even the criteria themselves) to change with time or under different circumstances. In addition, it might be required to account for new criteria in assessment of alternatives. Multi-criteria analysis provides such an opportunity and in such cases, needs to be revised. If the results justify adoption of cash handling procedures other than those selected, Kappe' and SAR should reconsider their choices.

It must be noted that there is a large need to change in cash transactions in the retail sector. By applying smart pricing strategies, this need can be reduced. On the other hand, given the speed and accuracy of electronic payments it is advisable for retailers to have a preference for non-cash payments. However, cash is still a popular form of payment among customers and they should be incentivized by retailers to make more use of cashless payment instruments. Special offers and discount on purchases can be helpful in this regard.

Application of pneumatic tube systems by some retailers has proved useful and it is expected to bring further cost savings for Kappe' and SAR as well. However, implementation of such a system requires agreement between retailers at Amsterdam Airport Schiphol for a joint cash handling process. In Appendix 7 this system and its costs are explained.

9.3. Reflection

As the starting point of the research, insight into the factors behind costs of cash handling was required. Using available literature on sources of costs provided a general understanding of the issue. For a more detailed picture of the costs in the current situation at Kappe' and SAR, it was needed to identify their major cost categories. Total cost of cash handling consists of several categories, and the project should be divided to discrete quantifiable units. To this end, ABC was utilized which proved a successful choice of method.

In the next step, effective cash handling processes of other retailers were investigated to be used as benchmarks. These complemented the comprehension of the current situation. Accordingly, new cash handling procedures were proposed to meet the criteria of interest for Kappe' and SAR.

Since selection of the proper alternative was made based merely on total costs, it was considered useful to test the robustness of the decisions using a Multi-Criteria Decision Analysis technique. Given its previous applications in ranking and prioritization of alternatives, Analytic Hierarchy Process was opted. This method was suitable also because it allows for using judgment of company executives along with the underlying information. More importantly, it is easily possible to add criteria or modify the pair wise comparisons between them as new circumstances arise.

Another measure for testing the prudence of selected alternatives was application of trends in cash payments. Using these trends as input aided in estimating the potential changes in total costs of different alternatives proposed for cash handling. The outcome provided further confidence in the choices made by Kappe' and SAR for alternatives K1 and S3 and the chances of their success.

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Appendices

Appendix 1: Fundamentals of machine depreciation

Determinants of depreciation

Depreciation expenses of the recycling machines (like other similar assets) depend on:

1. **Actual cost of asset:** costs of an asset include all costs incurred for acquiring it. The decision on number of machines will directly influence the expenses. Purchasing fewer machines results in faster depreciation of them and therefore quicker replacement requirements. The number of machines available for use in each period has an impact on up-front investments. Nevertheless, the total investment in machines in a specific period will remain unchanged unless the price of a machine was to rise.¹ However, having one machine has a number of disadvantages despite lower upfront investments (e.g. longer waiting time for employees, and more risk of disruption in the processes in case of a breakdown). These downsides will be discussed later in assessment of risks.
2. **Estimated salvage (residual or scrap) value of the asset:** The salvage value is the estimated amount that will be recovered at the point of selling the asset, discarding, or exchanging it for a new asset at the end of its useful service life. Since, the salvage value in the current systems has been excluded, we will now assume that the salvage value of machines to be acquired will be 0 so that the comparison between suggested solution and current systems is more accurate.
3. **Estimated useful life of the machine:** useful life depends on
 - a. **The intensity of use:** The way a machine is put in to use has an impact on its useful life. For instance using a machine at higher speed and shorter intervals (continuous operations) can result in shorter useful life. Depending on the number of machines to be bought for each lounge, intensity of use may vary. If machines are used as frequently as they are now in Kappe's new system, they will be depreciated over 5 years. For other cases, the machine will be depreciated faster/ more slowly and in the long term might need to be replaced with another machine.
 - b. **The standard of maintenance:** Regular maintenance checks and servicing help preserve a machine for a longer period of time. Similar to the current annual maintenance fees paid by Kappe' shops in lounges 3&4, each set of machines will result in €2850 of maintenance costs each year. If machines are used more often, more maintenance might be required, but since maintenance costs are paid yearly, additional maintenance (required in case a machine is used more intensively) will not be followed by any additional costs. In other words, for simplification, it is assumed that intensity of use will not affect the maintenance costs paid.

¹ A machine worth c today will be worth $c/(1+r)^n$ in n years. This price in n years is as costly as price c today. Therefore, as long as the price of a machine doesn't increase, the average annual costs for the machine will be equal regardless of the number of machines owned at a time. Also, note that it is unlikely for the price of the machine to rise since more state-of-the-art technologies will be introduced on the market by the time a specific model of recycling machines becomes obsolete.

- c. The replacement policy of the management: management might decide to replace a machine after a period shorter than its expected physical life for different reasons such as out-datedness or decreased operating speed.⁵⁴ Useful life of recycling machines used in calculations is 5 years. This is presumed 7 years for reconciliation software. Updating agreements can be reached with the supplying company and will be provided in this period. Therefore it can be claimed that replacement will be done only after the useful lives of machines are over.

Depreciation method

The method used for calculating depreciation is straight line depreciation. In this method it is assumed that "the asset will lose an equal amount of value each year". Therefore, annual depreciation is calculated as:

$$\text{annual depreciation} = \frac{\text{purchase price} - \text{salvage value of the asset}}{\text{estimated useful life of the asset}}$$

Appendix 2: Stakeholder analysis

Table 67 shows the complete stakeholder analysis and Table 68 shows the stakeholder types.

Table 37: Stakeholders analysis-complete

Stakeholder	Interest	Power position	Criticality	Power	Interest	Attitude	Stakeholder type	Involvement
Kappe' & SAR management	<ul style="list-style-type: none"> reduce the total costs of cash handling reduce the amount of time spent by staff on non-core activities reduce the risks involved in the process improve performance work with other retailers to benefit from economies of scale 	production	****	high	high	+	savior	pay attention to the stakeholder, harness their support and maintain it
Employees	<ul style="list-style-type: none"> spend less time on non-core activities undergo minimum amount of training have safe working conditions 	Production	*	low	low to medium	+/-	friend/ acquaintance	keep informed and maintain their support
Customers	<ul style="list-style-type: none"> reduced waiting time safe purchases acceptability of different payment instruments and currencies 	N/A	*	low	low	+	acquaintance	no action-keep informed if needed
Other retailers	<ul style="list-style-type: none"> get better contract terms by cooperating with Kappe' and SAR 	production	**	high	low	+	sleeping giant	raise awareness about the potential contributions of the project and seek positive input
Bank/ CiT company	<ul style="list-style-type: none"> maximize profit have fewer unplanned services reduce frequency of change delivery and cash pick-ups enhance the security of the process 	production	N/A	low/high	low	+	acquaintance/ sleeping giant	keep informed of desired changes-motivate to contribute to the project

Schiphol Group	<ul style="list-style-type: none"> • maximize profit • meet customers' requirements • ensure a safe work environment 	diffuse	****	high	high	+	savior	pay attention t the stakeholder, harness their support and maintain it
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Table 38: Stakeholder types

Type	Power	Interest	Attitude
Saviour	+	+	+
Friend	-	+	+
Sleeping giant	+	-	+
Acquaintance	-	-	+
Saboteur	+	+	-
Irritant	-	+	-
Time bomb	+	-	-
Trip wire	-	-	-

Appendix 3: Risk analyses

Tables 69 to 79 show the risk analysis for different cash handling processes discussed and Table 80 shows the risk impact matrix.

Table 39: Risk analysis for current system for SAR¹

category	identified risks	position in the chain	responsible party	cause	effect (who may be harmed)	control measures	probability	impact	rating	
cash shrinkage	embezzlement while composing cash advance and turnover deposit	end of shift	employee	employee's dishonesty		reduce employee contact with cash eliminate counting by all individuals increase supervision in counting room	L	L	L	1
cash shrinkage	mistake while composing cash advance and turnover deposit	end of shift	employee	fatigue, distractions	Employees will need to spend additional time to recount the amounts.	purchase a counting machine eliminate counting (even if only for part of the money)	M	VL-L	L	1
cash shrinkage	mistakes in exchanging denominations/currencies	during shift	supervisor	fatigue, distractions			VL	VL	L	1
cash insufficiency	delay in delivery of change money by GWK	N/A	GWK value transporter	external factors (e.g. traffic)	There may not be sufficient change.	Have an agreement with GWK about the latest time by which change needs to be	VL	L	L	1

¹ Average risk rating to be used in AHP is 1.

						delivered.				
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Table 40: Risk analysis for Kappe's old system¹

category	identified risks	position in the chain	responsible party	cause	effect (who may be harmed)	control measures	probability	impact	rating	
cash shrinkage	mistakes in counting start-up float in seal bags	start of shift	employee	fatigue, distractions	additional counting time dispute in reconciliation	buy a counting machine eliminate double counting	M	VL-L	L	1
	embezzlement while counting the start-up float	start of shift	employee	employee's dishonesty	dispute in reconciliation	discourage fraud by increasing the transparency of the procedure eliminate double counting	VL-L	L	L	1
	mistakes while using the coin machine	start of / during shift	employee	fatigue, distractions	dispute in reconciliation	N/A	VL	VL	L	1
	mistakes exchanges for denominations/currencies	during shift	employee store manager	fatigue, distractions	insufficiency of change dispute in reconciliation	maintain a safety stock	VL	VL	L	1

¹ Average risk rating to be used in AHP is 1.1.

	embezzlement in exchanges for denominations/currencies	during shift	employee store manager	employee's dishonesty	insufficiency of change dispute in reconciliation	Discourage such actions by informing of severity of consequences for staff involved maintain a safety stock at the shops to eliminate the need for bank visits	VL	L-M	L	1
	mistakes in counting transactions amount	end of shift	employee	fatigue, distractions	dispute in reconciliation need for tracking the dispute	buy a counting machine leave (part of) counting to third parties i.e. count only sufficient amount for start-up floats	M	L	L	1
	embezzlement while counting transactions amount	end of shift	employee	employee's dishonesty	dispute in reconciliation need for tracking the dispute	discourage fraud by increasing the transparency of the procedure leave (part of) counting to third parties i.e. count only sufficient amount for start-up floats	L	L	L	1
	mistakes in entering records to reconciliation software	end of shift	employee	fatigue, distractions	additional time for checking	seek assistance from shift supervisor, offer training for employees, adopt a user-friendly interface	L	VL	L	1
	embezzlement while taking seal bags to the bank	end of shift	employee	employee's dishonesty		leave to third parties limit the number of trusted employees for the task	L	L	L	1
	loss of invoices by ABN or mistakes in reports	N/A	ABN-AMRO	mistakes by bank staff	bank reports will not be reconciled with the amounts recorded.	Discussions will take place between Kappe' and the bank to find the reason.	VL	M	L	1

robbery	robbery while travelling to and from bank	during shift	employee	insufficiency of safety measures	dispute in reconciliation employees may be injured	reduce number of visits select more secure times for depositing	VL	M	L	1
	robbery while taking seal bags to the bank	end of shift	employee	insufficiency of safety measures	money will be stolen employees may be injured	leave to third parties keep the seal bags in the store safe and postpone depositing to more secure periods	VL	H	M	2

Table 41: Risk analysis for Kappe's new system¹

category	identified risks	time of occurrence	responsible party	cause	effect (who may be harmed)	treatment	control measures	probability	impact	rating	
cash shrinkage	embezzlement between withdrawing start-up float from the machine and depositing the transactions amount	during shift	employee	employee's dishonesty		mitigate	frequently check the reconciliation software for transactions data and reconcile with sales records	L	L	L	1
technical issues	machine breakdown	variable	supplier company	insufficiency of maintenance measures, improper choice of machine	employee won't be able to withdraw/deposit money reconciliation cannot be completed	transfer	have the supplier carry out regular maintenance for the machines	VL	M-H	M	2

¹ Average risk rating to be used in AHP is 1.8.

robbery	robbery on the way to the work place after withdrawing start-up floats from the machine or on the way to P&C West to deposit the transactions amount	start of shift/ end of shift	employee	insufficiency of safety measures	money will be stolen employees may be injured	mitigate	purchase more machines to reduce the traveling distance, reduce the number of required visits	VL	M-H	M	2
	robbery during depositing the money collected on the machine at the bank	variable	supervisor	insufficiency of safety measures		mitigate	select the location of the machines based on distance to bank deposit machines	VL	VH	M	2

Table 42: Risk analysis for alternative K1¹

category	identified risks	position in the chain	responsible party	cause	effect (who may be harmed)	control measures	probability	impact	rating	
cash shrinkage	embezzlement between withdrawing start-up float from the machine and depositing the transactions amount	during shift	employee	employee's dishonesty		frequently check the reconciliation software for transactions data and reconcile with sales records	L	L	L	1

¹ Average risk rating to be used in AHP is 1.8.

robbery	robbery on the way to the work place after withdrawing start-up floats from the machine or on the way to P&C West to deposit the transactions amount	start of shift/ end of shift	employee	insufficiency of safety measures	money will be stolen employees may be injured	purchase more machines to reduce the traveling distance, reduce the number of required visits	VL	M-H	M	2
	robbery during depositing the money collected on the machine at the bank	variable	supervisor	insufficiency of safety measures		select the location of the machines based on distance to bank deposit machines	VL	VH	M	2
technical issues	machine breakdown	variable	supplier company	insufficiency of maintenance measures, improper choice of machine	employees won't be able to withdraw/deposit money reconciliation cannot be completed	have the supplier carry out regular maintenance for the machines	VL	M-H	M	2

Table 43: Risk analysis for alternative K2¹

category	identified risks	time of occurrence	responsible party	cause	effect (who may be harmed)	treatment	control measures	probability	impact	rating
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¹ Average risk rating to be used in AHP is 1.2.

Lounges 1 and 2	cash shrinkage	mistakes in counting start-up float in seal bags	start of shift	employee	fatigue, distractions	additional counting time dispute in reconciliation	mitigate avoid	buy a counting machine eliminate double counting	M	VL-L	L	1
		embezzlement while counting the start-up float	start of shift	employee	employee's dishonesty	dispute in reconciliation	mitigate avoid	discourage fraud by increasing the transparency of the procedure eliminate double counting	VL-L	L	L	1
		mistakes while using the coin machine	start of shift/ during shift	employee	fatigue, distractions	dispute in reconciliation	accept	N/A	VL	VL	L	1
		mistakes exchanges for denominations/currencies	during shift	employee store manager	fatigue, distractions	insufficiency of change dispute in reconciliation	avoid	maintain a safety stock	VL	VL	L	1

		embezzlement in exchanges for denominations/currencies	during shift	employee store manager	employee's dishonesty	insufficiency of change dispute in reconciliation	mitigate avoid	disincentivize such actions by informing of severity of consequences for staff involved maintain a safety stock maintain a safety stock at the shops to eliminate the need for bank visits	VL	L-M	L	1
		mistakes in counting transactions amount	end of shift	employee	fatigue, distractions	dispute in reconciliation need for tracking the dispute	mitigate	buy a counting machine leave (part of) counting to third parties i.e. count only sufficient amount for start-up floats	M	L	L	1

		embezzlement while counting transactions amount	end of shift	employee	employee's dishonesty	dispute in reconciliation need for tracking the dispute	mitigate	discourage fraud by increasing the transparency of the procedure leave (part of) counting to third parties i.e. count only sufficient amount for start-up floats	L	L	L	1
		mistakes in entering records to reconciliation software	end of shift	employee	fatigue, distractions	additional time for checking	mitigate	seek assistance from shift supervisor, offer training for employees, adopt a user-friendly interface	L	VL	L	1
	cash shrinkage	loss of invoices by GWK or mistakes in reports	N/A	ABN-AMRO	mistakes by bank staff	bank reports will not be reconciled with the amounts recorded.	mitigate	discussions will take place between Kappe' and the bank to find the reason.	VL	M	L	1

Lounges 3 and 4	cash insufficiency	delay in delivery of change money by GWK	N/A	GWK value transporter	external factors (e.g. traffic)	there may not be sufficient change.	mitigate	have an agreement with GWK about the latest time by which change needs to be delivered.	VL	L	L	1
	cash shrinkage	embezzlement between withdrawing start-up float from the machine and depositing the transactions amount	during shift	employee	employee's dishonesty		mitigate	frequently check the reconciliation software for transactions data and reconcile with sales records	L	L	L	1
	robbery	robbery on the way to the work place after withdrawing start-up floats from the machine or on the way to P&C West to deposit the transactions amount	start of shift/ end of shift	employee	insufficiency of safety measures	money will be stolen employees may be injured	mitigate	purchase more machines to reduce the traveling distance, reduce the number of required visits	VL	M-H	M	2

	technical issues	machine breakdown	variable	supplier company	insufficiency of maintenance measures, improper choice of machine	employee won't be able to withdraw/deposit money reconciliation cannot be completed	transfer	have the supplier carry out regular maintenance for the machines	VL	M-H	M	2
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Table 44: Risk analysis for alternative K3¹

category	identified risks	time of occurrence	responsible party	cause	effect (who may be harmed)	treatment	control measures	probability	impact	rating	
cash shrinkage	embezzlement between withdrawing start-up float from the machine and depositing the transactions amount	during shift	employee	employee's dishonesty		mitigate	frequently check the reconciliation software for transactions data and reconcile with sales records	L	L	L	1
robbery	robbery on the way to the work place after withdrawing start-up floats from the machine or on the way to P&C West to deposit the transactions amount	start of shift/ end of shift	employee	insufficiency of safety measures	money will be stolen employees may be injured	mitigate	purchase more machines to reduce the traveling distance, reduce the number of required visits	VL	M-H	M	2

¹ Average risk rating to be used in AHP is 1.5.

technical issues	machine breakdown	variable	supplier company	insufficiency of maintenance measures, improper choice of machine	employee won't be able to withdraw/deposit money reconciliation cannot be completed	transfer	have the supplier carry out regular maintenance for the machines	VL	M-H	M	2
cash insufficiency	delay in delivery of change money by GWK	N/A	GWK value transporter	external factors (e.g. traffic)	there may not be sufficient change.	mitigate	have an agreement with GWK about the latest time by which change needs to be delivered.	VL	L	L	1

Table 45: Risk analysis for alternative S1¹

category	identified risks	position in the chain	responsible party	cause	effect (who may be harmed)	treatment	control measures	probability	impact	rating	
cash shrinkage	embezzlement between withdrawing start-up float from the machine and depositing the transactions amount	during shift	employee	employee's dishonesty		mitigate	frequently check the reconciliation software for transactions data and reconcile with sales records	L	L	L	1

¹ Average risk rating to be used in AHP is 1.4.

	mistakes in exchanging denominations/currencies	during shift	supervisor	fatigue, distractions		mitigate		VL	VL	L	1
robbery	robbery on the way to the work place after withdrawing start-up floats from the machine or on the way to P&C West to deposit the transactions amount	start of shift/ end of shift	employee	insufficiency of safety measures	money will be stolen employees may be injured	mitigate	purchase more machines to reduce the travelling distance, reduce the number of required visits	VL	M-H	M	2
technical issues	machine breakdown	variable	supplier company	insufficiency of maintenance measures, improper choice of machine	employees won't be able to withdraw/deposit money reconciliation cannot be completed	transfer	have the supplier carry out regular maintenance for the machines	VL	M-H	M	2
cash insufficiency	delay in delivery of change money by GWK	N/A	GWK value transporter	external factors (e.g. traffic)	There may not be sufficient change.	mitigate	have an agreement with GWK about the latest time by which change needs to be delivered.	VL	L	L	1

Table 46: Risk analysis for alternative S2¹

category	identified risks	position in the chain	responsible party	cause	effect (who may be harmed)		control measures	probability	impact	rating	
cash shrinkage	embezzlement while composing cash advance and turnover deposit	end of shift	employee	employee's dishonesty			reduce employee contact with cash eliminate counting by all individuals increase supervision in counting room	L	L	L	1
	mistake while composing cash advance and turnover deposit	end of shift	employee	fatigue, distractions	employees will need to spend additional time to recount the amounts.		purchase a counting machine eliminate counting (even if only for part of the money)	M	VL-L	L	1
	mistakes in exchanging denominations/currencies	during shift	supervisor	fatigue, distractions				VL	VL	L	1
robbery	robbery during depositing the money collected on the machine at the bank	variable	supervisor	insufficiency of safety measures		mitigate	select the location of the machines based on distance to bank deposit machines	VL	VH	H	3

¹Average risk rating to be used in AHP is 1.5.

Table 47: Risk analysis for alternative S3¹

category	identified risks	position in the chain	responsible party	cause	effect (who may be harmed)	treatment	control measures	probability	impact	rating	
cash shrinkage	embezzlement between withdrawing start-up float from the machine and depositing the transactions amount	during shift	employee	employee's dishonesty		mitigate	frequently check the reconciliation software for transactions data and reconcile with sales records	L	L	L	1
	mistakes in exchanging denominations/currencies	during shift	supervisor	fatigue, distractions		mitigate		VL	VL	L	1
robbery	robbery on the way to the work place after withdrawing start-up floats from the machine or on the way to P&C West to deposit the transactions amount	start of shift/ end of shift	employee	insufficiency of safety measures	money will be stolen employees may be injured	mitigate	purchase more machines to reduce the travelling distance, reduce the number of required visits	VL	M-H	M	2
technical issues	machine breakdown	variable	supplier company	insufficiency of maintenance measures, improper choice of machine	employees won't be able to withdraw/deposit money reconciliation cannot be completed	transfer	have the supplier carry out regular maintenance for the machines	VL	M-H	M	2

¹ Average risk rating to be used in AHP is 1.8.

robbery	robbery during depositing the money collected on the machine at the bank	variable	supervisor	insufficiency of safety measures		mitigate	select the location of the machines based on distance to bank deposit machines	VL	VH	H	3
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Table 48: Risk analysis for alternative S4¹

category	identified risks	time of occurrence	responsible party	cause	effect (who may be harmed)	treatment	control measures	probability	impact	rating	
cash shrinkage	embezzlement during the transactions of all shifts	during the shift	employees	employees' dishonesty		mitigate	installing surveillance cameras, regular reconciliation of accounts for clusters of employees to discourage fraud	M	L	L	1
	mistakes in counting	start of the day	employees, supervisor	fatigue, distractions	dispute in reconciliation need for tracking the dispute	mitigate	with supervision, use of machines and double countings the mistakes can be reduced	VL	L	L	1
technical issues	break down of coin/cash counting machines	start of the day	supervisor, supplier company	jams, absence of maintenance	lengthened counting processes	mitigate	preserve the machines in a proper state by regular maintenance	L	L	L	1

¹ Average risk rating to be used in AHP is 1.5.

ambiguity	unclear of responsible person for cash shrinkage due to the clustering system	any	supervisor	process type	difficulty in finding the responsible person in case of cash shrinkage	mitigate	install cameras dis-incentivize employees from embezzlement by rotating them frequently and defining severe consequences for cash shrinkage	VH	H	H	3
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Table 49: Risk analysis for alternative J1 ¹

category	Identified risks	Time of occurrence	Responsible party	Cause	Effect	treatment	Control Measures	Probability	Impact	Rating	
Administrative, Organizational	unforeseen changes with regards to shared offices (relocation, change in size, unavailability)		Schiphol Group	restructuring of the shops' locations	new shared office may not be available or may not be in a central position for all shops, Kappe' and SAR might need to approve of sharing their own back office space, Kappe' and SAR might decide to start working separately	accept	Use average estimates to determine the variables dependent on the location of shared offices	M	M	M	2

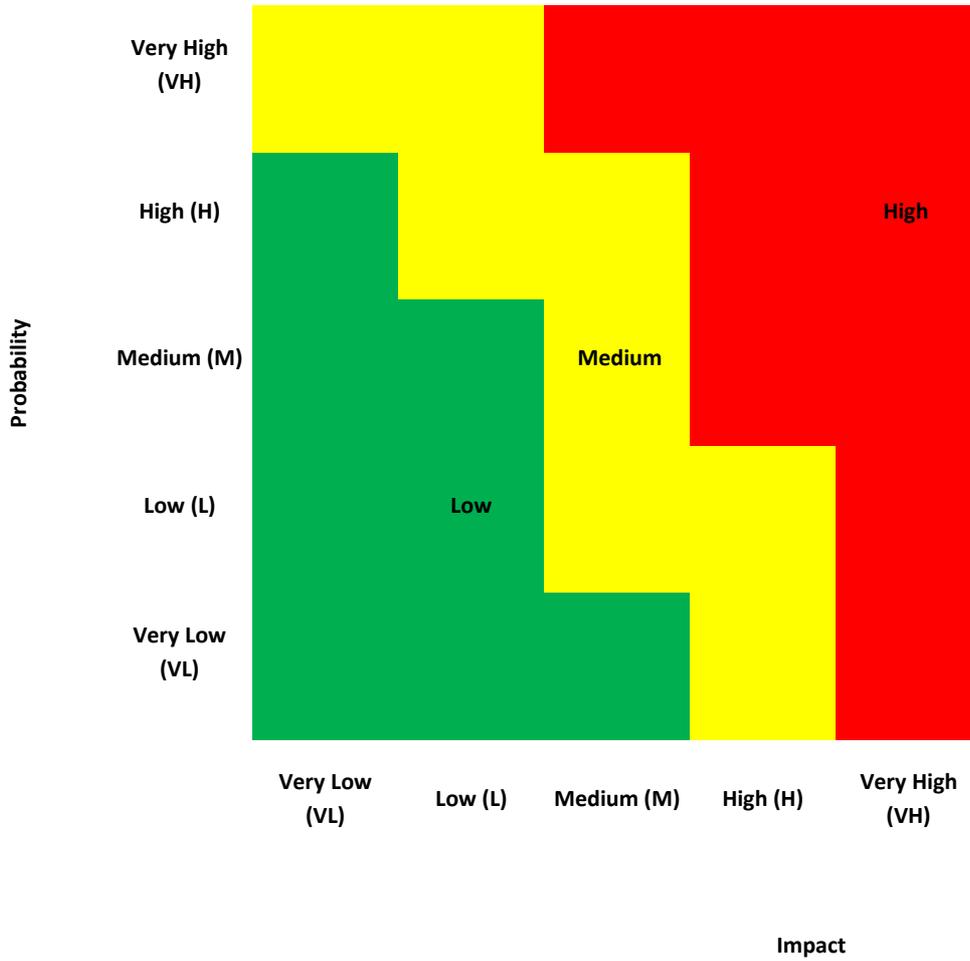
¹ Average risk rating to be used in AHP is 1.8.

	complication of administrative collaboration between Kappe' and SAR			changes in managerial board or strategies of companies, dispute over sharing of costs and responsibilities, changes in the joint cash office,	supervisors from Kappe' and SAR and cash office manager need to spend additional time to resolve arising issues, Kappe' and SAR might decide to stop working together	mitigate	organize a coordination committee consisting of cash office manager, a supervisor from SAR and one from Kappe' to communicate the issues with the company and have some autonomy in making decisions when required.	L-M	M-H	M-H ¹	2-3
	reconciliation conflict			sharing of seal bags between Kappe' and SAR	disagreement between Kappe' and SAR over their share in deposits	transfer	have clear task delegation for administrative staff reach agreements beforehand over how such conflicts will be handled	L-M	L-M	L-MI	1-2
	irregularities in skimming schedules			differences in daily Euro and Foreign currency transactions in different lounges	machines in different lounges need to be skimmed in different intervals each machine might need to be skimmed at varying times (e.g. 1.5 days)	mitigate	check the remaining capacity of machines at different intervals and base skimming intervals on experience as well as suggested schedules.	L-M	L	L	1
cash shrinkage	embezzlement between withdrawing start-up float from the machine and depositing the transactions amount	during shift	employee	employee's dishonesty		mitigate	frequently check the reconciliation software for transactions data and reconcile with sales records	L	L	L	1

¹ There can be a higher risk if other retailers join Kappe' and SAR.

Security	Insecurity and exposure			separation of cash office from shops and sharing between large number of employees	at the start and end of shifts many employees will be entering and leaving the office holding cash and it could attract the attention of thieves and provide an opportunity for them	mitigate	ideally use a shared back office rather than a separate office	L	M	M	2
	robbery on the way to the work place after withdrawing start-up floats from the machine or on the way to P&C West to deposit the transactions amount	start of shift/ end of shift	employee	insufficiency of safety measures	money will be stolen employees may be injured		purchase more machines to reduce the traveling distance, reduce the number of required visits	VL	M-H	M	2
	robbery during depositing the money collected on the machine at the bank	variable	cash office manager	insufficiency of safety measures		mitigate	select the location of the machines based on distance to bank deposit machines	VL	VH	H	3
technical issues	machine breakdown	variable	supplier company	insufficiency of maintenance measures, improper choice of machine	employees won't be able to withdraw/deposit money reconciliation cannot be completed	mitigate	have the supplier carry out regular maintenance for the machines	VL-L	M-H	M	2

Table 50: Risk impact matrix



Appendix 4: Calculation of costs for alternative processes

6.5. Separate alternatives for Kappe'

Not disclosed in this document

6.6. Separate alternatives for SAR

6.6.1. Using cash recycling machines (S1)

Determining the number of machine sets

It is required to purchase 3 sets¹ of recycling machines. Similar to Kappe's case, having one set of machines in lounges 1, 2 and 3 is also an effort to reduce distances travelled by the staff for withdrawing and depositing money. It will also eliminate the need for travelling between lounges which can take additional time.

Given the annual amount of transactions at SAR and Kappe' and using Kappe's experience with regards to the frequency of skimming and capacity of recycling machines, the following calculations have been done to estimate the number of machines to be purchased by SAR.

It is desirable to avoid skimming more than once a day. This must be true both in the low season and in the high season. In addition, if more than 3 times of skimming is needed each week, it would need to be done during the weekend for which administrative wages are twice as much. Calculations included later in the text, will show that having 3 sets of cash recycling machines will satisfy this condition as well.

Location of machine sets

The machines should be installed in shops Centraal, Zuid and West. Each set of machines will be used by the other shops of SAR in the same lounge as well. Table 91 shows the shops in which cash recycling machines should be installed.

¹ Each set is one cash recycling machine and one coin recycling machine

Table 51: Location of three cash three recycling machines at SAR

Lounge	Location of cash recycling machines	Other shops using the same machine
1	Zuid	Whiskey & Cigars Confect L1
2	Centraal	
3	West	FS&C ConfectL3

The choice about the three locations has been made based on:

- ❖ relatively central position in the lounge and proximity to the bank
- ❖ larger amount of transactions compared to the other stores in the lounge

Skimming the machines

Table 92 shows the transactions divided by lounge and season for SAR and also calculations for required number of skimming done based on these values.

Table 52: Skimming for alternative S1

Lounge	1		2		3	
	high season	low season	high season	low season	high season	low season
Total transactions (€)	9,212,006	6,693,399	7,177,073	6,381,144	6,293,835	4,660,369
amount in the machine at the time of skimming in that period	76,000	89,000	76,000	89,000	76,000	89,000
Frequency of skimming in the corresponding period	121	75	94	72	83	52
Weekly frequency of skimming per machine	4-5	3	3-4	2-3	3	2

It can be seen in Table 92 that with one set of machines in each lounge, both in the high season and the low season, skimming will not need to be done more than once a day. Therefore, the desired condition can be met and it can be concluded that 3 machines would be sufficient for SAR's shops. It should be emphasized that having fewer machines would call for travelling between lounges and thereby impose additional internal costs.

Costs

Employee and administration costs

Table 93 shows the amounts of time for different cash handling tasks and the number of staff working at each store.

Table 53: Time for employee tasks for three cash recycling machines at SAR

		a	b	c	d	e	f
Lounge	store	distance to the nearest machine's location (min per shift)	time for preparing start-up float (min per shift)	time for end of shift activities (min per shift)	number of shifts per day	Start of shift activities ¹ (min per day)	End of shift activities ² (min per day)
1	Zuid	0	1	5	10	10	50
	Whiskey & Cigars	1	1	5	3	6	18
	Confect L1	1	1	5	3	6	18
2	Centraal	0	1	5	10	10	50
3	West	0	1	5	10	10	50
	FS&C	3	1	5	3	12	24
	ConfectL3	1	1	5	3	6	18
	Sum				42	60	228

As mentioned before, if one machine needs to be skimmed more than three times a week, this needs to be done on the weekends. A total of 497 times skimming is required on a yearly basis. Of this number, 433 times would be done on week days (with a normal wage of €32 per hour for administration) and the other 64 times would be done on the weekends (with a high wage of €60 per hour for administration).

Since SAR will continue to outsource transfer of cash from shops to its bank account to GWK-Travellex, cash machines will need to be skimmed by administrative staff of SAR at proper intervals. GWK will visit to pick up the seal bags when needed. Therefore, similar to separate alternative K3, each time of skimming would take around 20 minutes. Therefore, skimming would take 21 hours in the weekends and 144 hours on the week days, on an annual basis.

Table 94 shows calculations for administrative tasks. Figures are derived from SAR's current system and Kappe's new system in which cash machines are used.

¹ e=(a+b)*d

² f=(a+c)*d

Table 54: Administration costs for alternative S1

Administrative task	Annual time (hour per year)	Annual cost (€ per year)
High wage skimming	21	1,260
Normal wage skimming	144	4,608
Research on discrepancies	209	6,688
financial administration	886	28,352
maintaining and control coin machines	638	20,416
ordering and handling coins	281	8,992
maintaining bulk cash advance/ check of safety stock content	183	5,856
maintenance cash machine	246* 3 machines	23,616
Sum	3,1100	99,788

Costs of different cash handling tasks of employees are shown in Table 95.

Table 55: Employee costs for alternative S1

	Daily time (min per day)	Annual time (hour per year)	Annual cost ¹ (€ per year)
Start of the shift	60	365	11,680
During the shift activities ^{II}	5	31	992
End of the shift	228	1,387	44,384
Administration		3,1100	99,788
Sum			156,844

GWK-Travellex fees

SAR would need to pay the same amount to GWK-Travellex as it does in the current system since the contract is based on the total value of deposits. Therefore, fees would be still €92,000.

Technology costs

The costs of machines will include costs of purchasing 3 sets of machines (3 cash recycling and 3 coins recycling). As calculated in separate alternative K1, the cost would be €41,807 per year.

¹ Equals annual time*hourly wage

^{II} Since SAR has decided to continue to maintain safety stock at its shops, time for providing additional float during the shift would be equal to current system.

Total costs

The results of calculations are presented briefly in Table 96.

Table 56: ABC for alternative S1

Cost category	Cost (€)	Cost per transaction (€)	Cost per Euro of transaction (€)	Share in total costs	Percentage change compared to current situation
Staffs' cash handling tasks	156,844	0.09	0.0039	54%	-32%
GWK-Travellex fees	92,000	0.05	0.0023	32%	0%
Technology costs	41,807	0.02	0.0010	14%	-
Total	290,651	0.16	0.0072	100%	-10%

6.6.2. Working with ABN-AMRO (S2)

Costs

Employee and administration costs

❖ Start of shift

At the beginning of shift, each employee would take their red seal bags from the safe similar to the current system. Therefore, the amount of time spent on start of shift activities would be 767 hours per year as it is in the current system.

❖ During the shift

Similar to the current system if additional change is required, employees can use the safety stock in the back office. Therefore, amount of time spent on during the shift activities would remain equal to the current system (i.e. 31 hours per year).

❖ End of shift

In addition to tasks carried out by employees at the end of shifts in the current system, they would need to go to the bank to deposit their seal bags. This means 42 visits per day each of which would take an average of 5 minutes. Therefore, time for end of shift activities would be 1278¹ hours more than it is in the current system of SAR (5110 hours per year). Total time for administration would be 6388 hours per year.

❖ Administration

There would be no particular change in administrative tasks if SAR starts working with ABN-AMRO. Thus, administration would be around 1278 hours per year.

¹ 5 (min per visit)*42 (visits per day)*365 (day per year)/60 (min per hour)=1278

ABN-AMRO fees

The bank requires currencies to be deposited separately. Therefore, each day 42 Euro and about 21 foreign seal bags¹ would be taken to the bank by employees each day (15,330 and 7,665 seal bags per year, respectively). A compensation of 2% is expected to be provided by ABN-AMRO for foreign currencies. (Table 97)

Table 57: Number of seal bags for alternative S2

	Number per year	Annual cost (€ per year)
Euro seal bags	15,330	49,823
Foreign seal bags	7,665	24,911
Coin orders	-	7,000
Compensation		74,200
Sum		7,534

Total costs

The results of calculations are presented briefly in Table 98.

Table 58: ABC for alternative S2

Cost category	Cost (€)	Cost per transaction (€)	Cost per Euro of transaction (€)	Share in total costs	Percentage change compared to current situation
Staffs' cash handling tasks	270,848	0.15	0.0067	97%	+18%
ABN-AMRO fees (after compensation)	7,534	0.00	0.0002	3%	-92%
Total (after compensation)	278,382	0.16	0.0069	100%	-14%

6.6.3. Using cash recycling machines and working with ABN-AMRO (S3)

Costs

Employee and administration costs

The amount of time spent on cash handling by employees at the start of, during, and end of their shifts would be 365, 31 and 1387 hours per year, respectively. This is equal to what was calculated for alternative S1 (using cash recycling machines).

Time required for administrative tasks would be equal to alternative S1 except for skimming of machines. In this case, skimming would take 30 minutes each time since after preparing seal bags, they need to be deposited at ABN-AMRO machines by the supervisor.

¹ The amount of foreign currencies is much lower than Euros. Thus, it is sufficient to have one seal bag for foreign currencies after each shift (3shifts per day) at each shop (7 shops) that is a total of 21 foreign seal bags per day.

Similar to alternative S1, a total of 497 times skimming is required on a yearly basis. Of this number, 433 times would be done on week days (216.5 hours per year) and the other 64 times would be done on the weekends (32 hours per year).

Table 99 shows annual time and cost of administration.

Table 59: Administration costs for alternative S3

Administrative task	Annual time (hour per year)	Annual cost (€ per year)
High wage skimming	32	1,920
Normal wage skimming	216.5	6,928
Research on discrepancies	209	6,688
financial administration	886	28,352
maintaining and control coin machines	638	20,416
ordering and handling coins	281	8,992
maintaining bulk cash advance/ check of safety stock content	183	5,856
maintenance cash machine	246* 3 machines	23,616
Sum	3,184	102,768

Costs of different cash handling tasks of employees are shown in Table 100.

Table 60: Employee costs for alternative S3

	Daily time (min per day)	Annual time (hour per year)	Annual cost ¹ (€ per year)
Start of the shift	60	365	11,680
During the shift activities ^{II}	5	31	992
End of the shift	228	1,387	44,384
Administration		3,184	102,768
Sum			159,824

ABN-AMRO fees

The number of seal bags has been calculated based on the number of seal bags calculated for alternative K1 and by comparing the value of transactions at different lounges.

$$\text{Number of seal bags} = \text{number of seal bags for Kappe}' * \frac{\text{value of transactions for SAR}}{\text{value of transactions for Kappe}'}$$

Table 101 shows the calculated number of seal bags.

^I Equals annual time*hourly wage

^{II} Since SAR has decided to continue to maintain safety stock at its shops, time for providing additional float during the shift would be equal to current system.

Table 61: Number of seal bags for alternative S3

	Euro seal bags	Foreign seal bags
Alternative K1	2,217	1,532
Alternative S3	2,212	1,529

Therefore, by installing cash recycling machines also in lounges 1 and 2, in total 2217 Euro seal bags and 1532 foreign currency seal bags will be deposited at ABN-AMRO. A compensation of 2% of value of foreign currencies in Euros will be provided to Kappe'.¹

Table 102 shows the fees that need to be paid to ABN-AMRO.

Table 62: ABN-AMRO fees for alternative S3

	Number per year	Annual cost (€ per year)
Euro seal bags	2,212	7,189
Foreign seal bags	1,529	4,969
Coin orders	-	7,000
Compensation		74,200
Sum		-55,042

Technology costs

Similar to alternative 1, technology costs would be €41,807

Total costs

The results of calculations are presented briefly in Table 103.

Table 63: ABC for alternative S3

Cost category	Cost (€)	Cost per transaction (€)	Cost per Euro of transaction (€)	Share in total costs	Percentage change compared to current situation
Staffs' cash handling tasks	159,824	0.09	0.0040	109%	-30%
ABN-AMRO fees (after compensation)	-55,042	-0.03	-0.0014	-38%	-160%
Technology costs	41,807	0.02	0.0010	29%	-
Total (after compensation)	146,589	0.08	0.0036	100%	-54%

¹ Compensation = €3,709,987*2%=€74,200

6.6.4. Using drop-in safes (S4)

Costs

Employee and administration costs

❖ Start of the day

The money in the till should be counted at the beginning of every day with a counting machine (to make sure there is sufficient change, if not provide it from the safety stock basin). Amounts must be entered in the computer. This would take 7 minutes per day per cash register (15 cash registers in total). Therefore the total time for start of the shift tasks of employees would be equal to:

$$7*15*365/60=639 \text{ hours per year}$$

❖ During each shift

Since a safety stock basin is maintained at SAR's shops, providing additional change can be done easily similar to the current situation and the estimate of 31 hours per year can be used as an estimate.

❖ End of the day

Drop-in safes need to be taken to the back office and empty ones should be placed at the cash registers for the following day. This would take about 3 minutes per day for each cash register¹, therefore in total:

$$3*15*365/60= 274 \text{ hours per year}$$

❖ Administration

Financial Administration(Every day reconciling the money in the safe with employees who worked in the shift) is assumed to be 1.5 hours per day for all stores, (approximately one-third as costly as the current system if there are no cash differences because they will reconcile per drop-in safe instead of per employee and we assumed it takes the same amount of time per each single reconciliation, but if there are cash differences clusters need to be checked since figures are not available per employee)

Counting of the till can be assumed to be 2 hours per day given the information collected for Kappe's Etos shop using drop-in safes.¹¹ Table 104 shows the costs of cash handling activities of staff.

Table 64: Employee costs for alternative S4

Cost pool	Time (hours per year)	Cost (€ per year)
Start of day	639	20,448
During each shift	31	992
End of day	274	8,768
Administration	1,278	40,896
Sum		71,104

¹ There are a total of 15 cash registers in SAR's stores.

¹¹ At Etos there are 2 cash registers and cash difference is spotted once or twice a week(2*7=14 reconciliations) We assume there will be more (3-4)cash differences every day in SAR's system because there are 15 cash registers in SAR's system and there are larger amounts in their tills than Etos

GWK-Travelex fees

As the fees are charged based on annual transactions, they would be equal to the current situation.

Technology and other costs

Costs of investment are calculated in Table 105.

Table 65: Investments for alternative S4

	Number	Unit price (€)	Total price (€)	Depreciation period (years)	Annual cost ^I (€ per year)
Number of drop-in safes ^{II}	45	500	22,500	3	7,500
coin counting machine ^{III}	7	300	2,100	5	420
cash counting machine ^{IV}	7	500	3,500	5	700
Sum					8,620

Table 106 shows the results of ABC for alternative S4.

Table 66: ABC for alternative S4

Cost category	Cost (€)	Cost per transaction (€)	Cost per Euro of transaction (€)	Share in total costs	Percentage change compared to current situation
Staffs' cash handling tasks	71,104	0.04	0.0018	41%	-69%
GWK-Travelex fees	92,000	0.05	0.0023	54%	0%
Investments	8,620	0.00	0.0002	5%	-
Total	171,724	0.10	0.0042	100%	-47%

^I Equals Total price/ depreciation period

^{II} Number of drop-in safes per cash register (including reserves)* number of cash registers=3*15

^{III} One machine per shop

^{IV} One machine per shop

6.7. Joint alternatives for Kappe' and SAR

6.7.1. Shared use of cash recycling machines by Kappe' and SAR (J1A)

Not disclosed in this document

6.7.2. Shared use of cash recycling machines by Kappe', SAR and other retailers at Amsterdam Airport Schiphol (J2)

Some of the cost pools will not be affected in case other retailers join Kappe' and SAR in cash handling. These are below referred to as static expenses. On the other hand, there are cost pools that would change depending on the number of retailers joining and their annual transactions. These can be regarded as dynamic expenses.

Costs

1. Static expenses

Static expenses include:

- ❖ **Start of the shift activities:** The amount of time spent by each retailer on start of shift activities is the sum of the distance to cash office and about 1 min per employee for preparing till float. Similar to the joint alternative, a central position for cash office can be assumed. Thus, it can be claimed that total time spent on start of shift activities by employees of Kappe' and SAR will not change significantly with joining of other retailers.
- ❖ **During the shift activities:** similar to other cases where Kappe' uses cash recycling machines, in case additional change is needed employees would contact those who will start their shifts shortly. Therefore, it can be assumed that time for during the shift activities, is negligible. Due to availability of safety stock at SAR, the amount of time for preparing additional floats would be still as it was in other cases.
- ❖ **End of shift activities:** The amount of time spent by each retailer on end of shift activities is the sum of the distance to cash office added to about 5 min per employee for depositing money and entering the transactions into a computer. Given the central location of cash offices, the total time spent on end of shift activities by employees of Kappe' and SAR will remain unchanged with joining of other retailers.
- ❖ **Administration for monitoring finances:** Time required for reconciliation of transactions and research on discrepancies depends on the transactions of the companies and their number of

employees.¹Therefore, time expended on monitoring finances would remain equal to joint alternative for Kappe' and SAR.

2. Dynamic expenses

Dynamic expenses will be divided among companies based on their share in total annual transactions in a joint cash handling process. These costs are explained below.

❖ Administration

- **Administration on machines:** Depending on the number of machines, total administration on them would rise and so would the costs for Kappe' and SAR.
- **Joint cash office organization:** In case more retailers collaborate with Kappe' and SAR in cash handling, more coordination is required between the companies.
- ❖ **Fees paid to ABN-AMRO:** An increase in total annual transactions, results in larger number of seal bags handed over to the bank. Compensation offered by the bank to Kappe' and SAR would remain intact though.
- ❖ **Technology costs:** With the increase in annual transactions by joining of other retailers, the costs of purchasing machines and configuring software would rise.
- ❖ **Rent of joint cash office:** As the number of machine sets increases, larger surface area is required for cash offices and the rent fee rises.

Below calculations for dynamic expenses are included.

Costs of Administration on machines

Time for administration on machines for each retailer includes ordering and handling coins (281 and 1,148 hours per year respectively) added to skimming time.

To determine the number of skimming required, the following formula can be used separately for the weekdays and weekends.

$$\begin{aligned} \text{Number of skimming after joining of other retailers} \\ = \text{average number of skimming per machine in joint alternative} * \text{number of machines} \end{aligned}$$

Joint cash office organization

For administration of each joint cash office 5 hour per week is needed if only Kappe' and SAR work together. It can be assumed that with each other retailer joining them, an additional 2 hours per week would be required for each cash office. Therefore, the total costs of joint cash office organization can be calculated using the formula below.

$$\begin{aligned} \text{administration of joint cash office} \\ = (5 + 2 * \text{number of other retailers joining Kappe' and SAR})^{\text{II}} * 52^{\text{III}} * 3^{\text{IV}} \end{aligned}$$

^I The process of cash handling is also important. However, since it is not changing compared to joint alternative 1, this factor can be disregarded.

^{II} Hours per week per lounge

^{III} Weeks per year

^{IV} Lounges

Fees paid to ABN-AMRO

The total number of seal bags can be calculated by using:

Number of seal bags =

$$\text{number of seal bags for joint alternative} * \frac{\text{total annual transactions for Kappe', SAR and other retailers}}{\text{total annual transactions for Kappe' and SAR}}$$

Technology costs

Depending on the number of machine sets, technology costs change. To estimate the number of machines the following formulas have been used:

$$\begin{aligned} &\text{Average transaction handled by each machine in joint alternative} \\ &= \frac{\text{total annual transactions for Kappe' and SAR}}{\text{number of machines in joint alternative}} = \frac{80,919,230}{5} = 16,183,846 \end{aligned}$$

$$\text{Number of machines} = \frac{\text{total annual transactions for Kappe', SAR and other retailers}}{\text{Average transaction handled by each machine in joint alternative}}$$

Technology costs can be calculated using Table 128 below once the number of machines is decided upon.

Table 67: Technology costs for alternative J2

cost pool	basic cost (€)	Factoring number
coin change machine	3,200	Number of machines
maintenance of coin change machine	250	Number of machines
maintenance of cash machine	2,100	Number of machines
cash machine	6,600	Number of machines
software costs	3,857	Number of retailers
Sum	12,150*number of machines+3,857*number of retailers ¹	

Rent of joint cash office

The rent of the joint cash offices would be:

$$\text{Total rent (€ per year)} = 12 \text{ sq. m per machine} * \text{number of machines} * \text{€600 per year per sq. m}$$

Total costs

Depending on the number of retail groups joining Kappe' and SAR and their annual transactions, different amounts of cost saving can be achieved by Kappe' and SAR. Table 129 summarizes the cost scheme.

¹ Including Kappe' and SAR

Table 68: Costs in alternative J2

	Cost category	Cost for Kappe'/ SAR (€)
Static expenses	Staffs' cash handling tasks	Equal to alternative J1A
	Administration for monitoring finances	Equal to alternative J1A
Dynamic expenses	Administration on machines	Depending on the number of machines
	Joint cash office organization	Depending on the number of retailers
	ABN-AMRO fees (after compensation)	Depending on the total transactions
	Technology costs	Depending on the total transactions
	Joint cash office rent	Depending on the number of machines
	Total (after compensation)	To be determined using sensitivity analysis charts

Appendix 5: Flowcharts and additional information on alternatives

Alternative S1

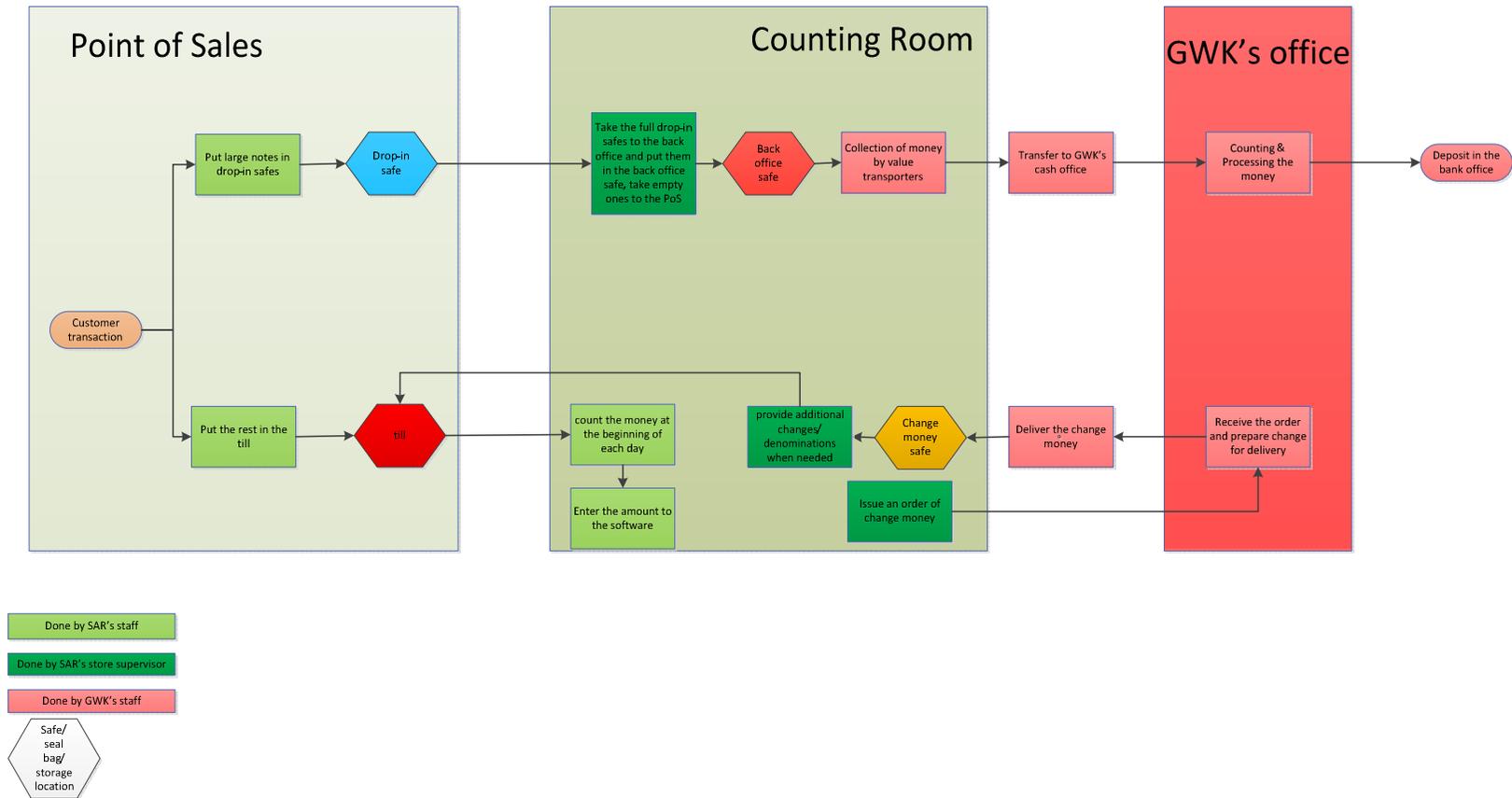


Figure 33: Flowchart for use of drop-in safes

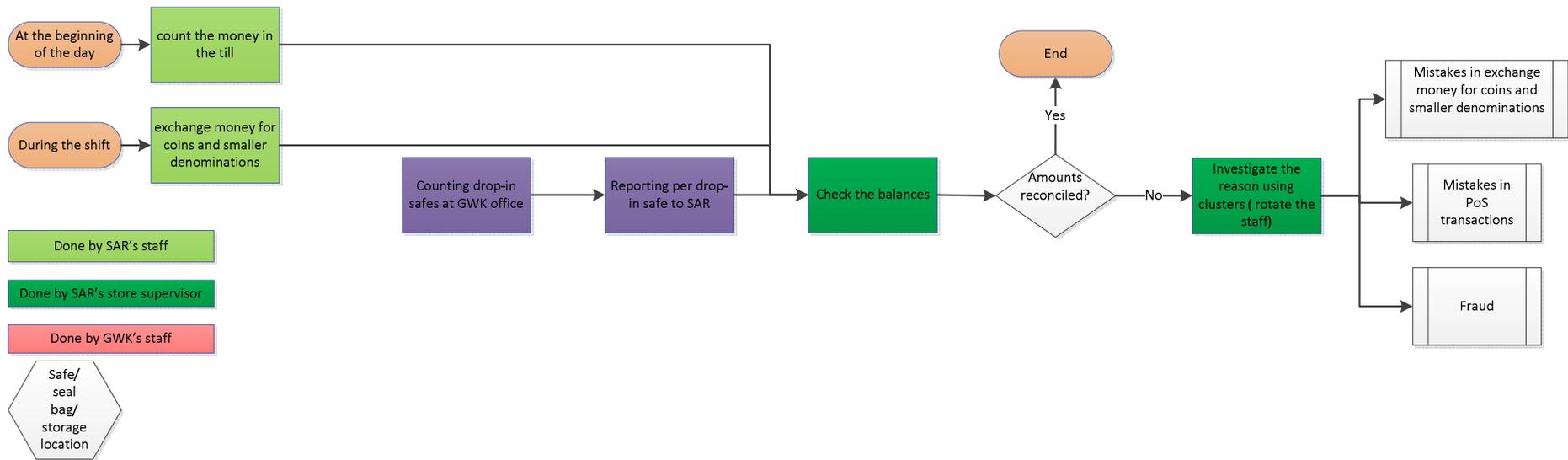


Figure 34: Scheme of control for use of drop-in safes

Alternative J1

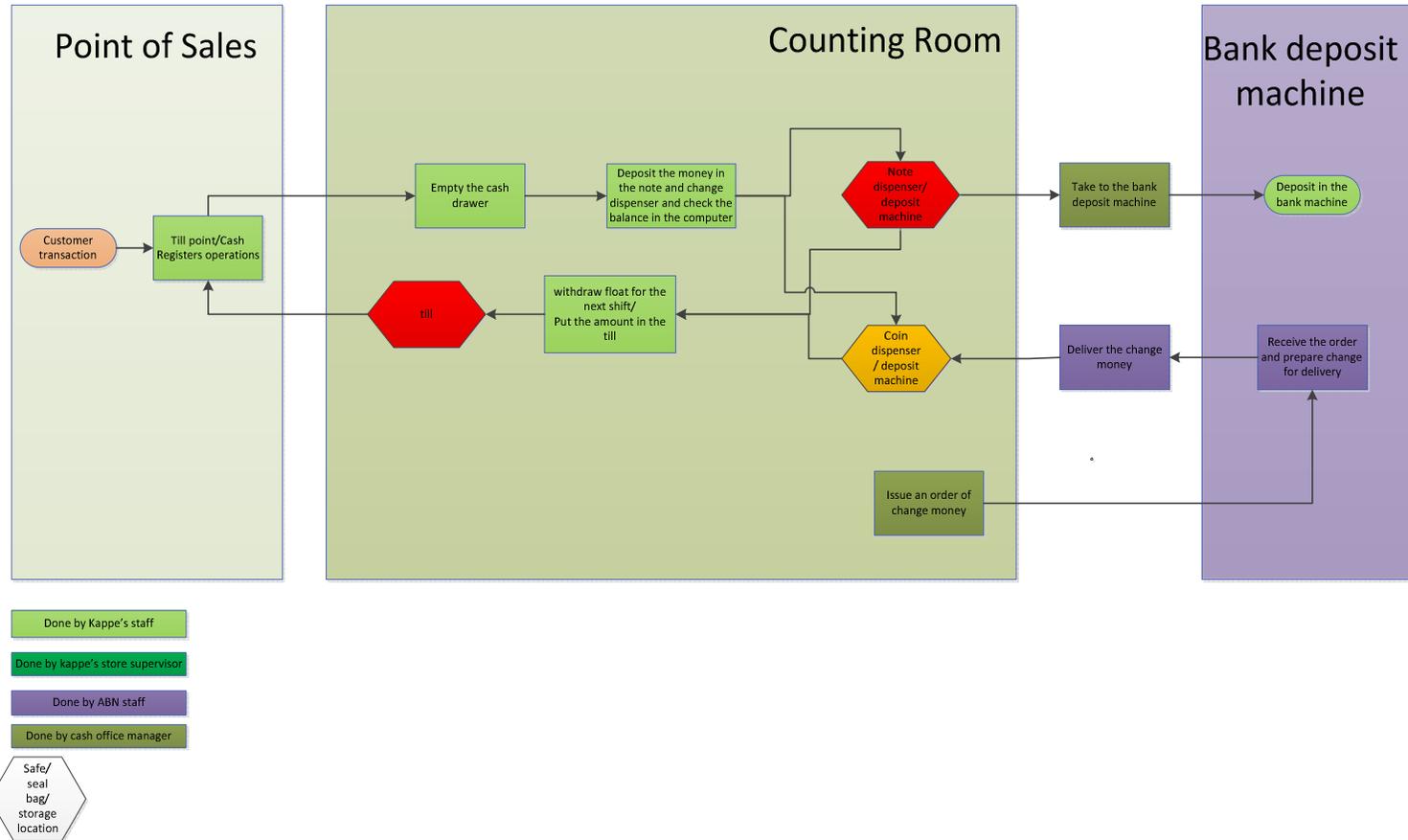


Figure 35: Flowchart for alternative J1

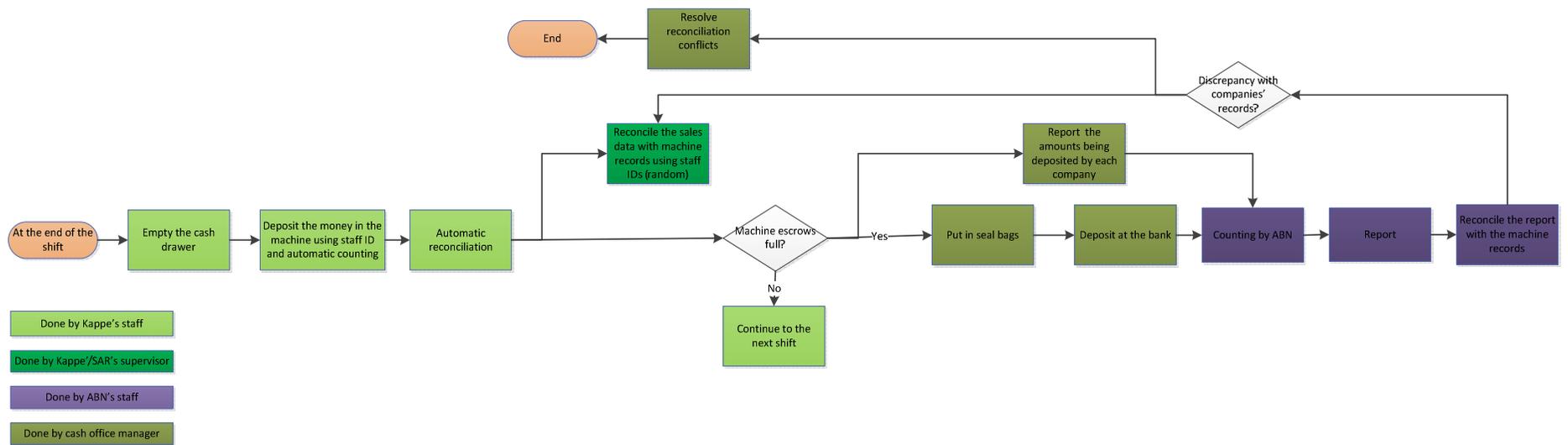


Figure 36: Scheme of control for alternative J1

Division of Tasks

In the new organizational structure, there will be new administrative tasks to be considered. Each cash office needs to be managed by someone trusted by both companies. The three cash office managers will be responsible for skimming the machines, resolving any kind of conflicts in the office, communicating with the bank about two companies' deposits and ensuring the security of the office. The responsibilities of those currently functioning as store managers in either company might change a bit. Table 130 depicts the proposed division of tasks for the joint cash handling alternative compared to the current systems.

Table 69: Division of tasks among Kappe' and SAR's employees for alternative J1A

Task	Current systems					Joint solution				
	Kappe'		SAR			Kappe'		Joint	SAR	
	employees	store manager	supervisor	employees	shift supervisor	employees	supervisor	cash office manager	employees	(shift)super visor
withdrawing start-up float	x			x		x			x	
depositing collected amounts in the machine	x					x			x	
sending transactions report to the bank (share of each retailer in the deposits)								x		
checking the balance in the machine and skimming at appropriate intervals			x					x		

placing coin orders and refilling the coin machines		x	x		x			x		
resolving disruptions in the process		x	x		x			x		
resolving conflicts between Kappe' , SAR and ABN in reconciliations							x	x		x
reconciling transactions and reconsidering if needed after receiving bank report		x	x				x			x
security of the office (e.g. checking camera videos)		x	x		x				x	

Alternative J3

6.7.3. Shared use of cash recycling machines by Kappe' and SAR while outsourcing operation of back office to G4S (J3)

Table 131 shows the properties of CASH-360 solution and figure 41 shows the process of cash handling as proposed by G4S.

Table 70: Properties of CASH-360 solution

In-store technology	IT	Security/HSSE	People and processes	Cash management	Finance and administration	Easy to manage	Business case	Future proof
Cash handling device	Machine interfaces with CiT companies	Secure storage (vaults, high security locks)	External and internal security policy and protocols (anti-robbery and burglary, anti-fraud)	CiT and bank fit technology and process	Closed reconciliation	Single point of contact	No upfront investment	Flexing costs
Machine software including licensing	Machine interfaces with bank/ cash processing companies	Insurance policy compliance	End-to-end cash process design	Money collection and delivery service to / from device	ERP compliant	Online management to all technology and related services	Transparent cost structure	Scalable (in-store and international)
Training (on site and HQ's)	PoS and ERP interfacing	Security (HSSE) policy compliance		Ordering cash and change (notes and coins)	Track and trace (from store to bank account)	Electronic ordering	Flexing costs	Corporate social responsible adaptive to new future technology
Delivery and installation	Technology agnostic plug and play infrastructure	Easy auditing	Stores' operations hours' process continuity	Accounting software integration	Transparent and easy-to-audit invoicing	HQ independent ordering process including authorization procedures	Guaranteed lower total cost of ownership	Supports non-cash developments
Disturbance monitoring and maintenance	Continuous updates	In-store security measurements	Process description including back-		Closed petty cash process	One stop shop		

(help desk and on site)			up procedures					
Preventive maintenance	Efficient user interface	Preventive security measures	Cash cycle optimization process		Non-cash valuables reconciliation process	Customized management reporting		
Adjustable to multiple store types	Secure IT infrastructure	(clear) liabilities	Single process, multi-store solutions		Real time insights	Effective customer service center		
Spare part management	Flexible IT design	Fully screened G4S employees	Continuous user training					

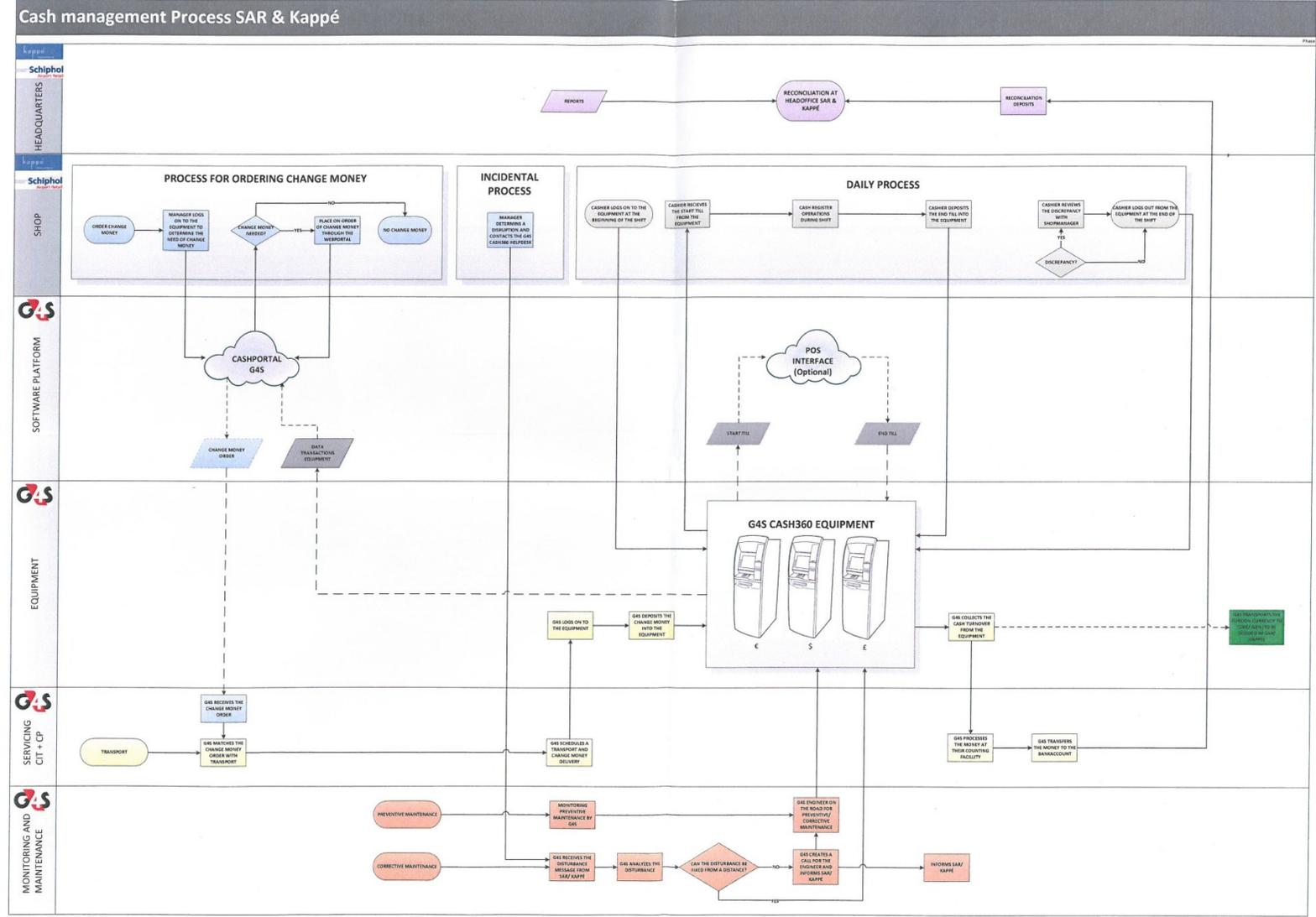


Figure 37: Flowchart for alternative J3

Appendix 6: AHP

Table 132 shows Saaty's scale for completing comparison matrix in AH.

Table 71: The fundamental scale for AHP

Intensity of importance on an absolute scale	Definition	Explanation
1	Equal importance	Two activities contribute equally to the objective
3	Moderate importance of one over another	Experience and judgement favour one activity over another
5	Essential or strong importance	Experience and judgement strongly favour one activity over another
7	Very strong importance	An activity is strongly favoured and its dominance demonstrated in practice
9	Extreme importance	The evidence favouring one activity over another is of the highest possible order of affirmation
2, 4, 6, 8	Intermediate values between the two adjacent judgements	When compromise is needed
Reciprocals	If activity i has one of the above numbers assigned to it when compared with j, then j has the reciprocal value when compared to i	
Rationals	Ratios arising from the scale	If consistency were to be forced by obtaining n numerical values to span the matrix

Calculation steps for weights in AHP methodology

Consider $[Ax = \lambda_{\max}x]$ where

- ❖ A is the comparison matrix of size $n \times n$, for n criteria.
- ❖ x is the Eigenvector of size $n \times 1$
- ❖ λ_{\max} is the Eigenvalue, $\lambda_{\max} \in \Re > n$.

Take the squared power of matrix A, i.e., $A^2 = A.A$

Find the row sums of A^2 and normalize this array to find E_0 .

Set $A := A^2$

1. Take the squared power of matrix A, i.e., $A^2 = A.A$
2. Find the row sums of A^2 and normalize this array to find E_1 .
3. Find $D = E_1 - E_0$.

4. IF the elements of D are close to zero, then $X = E_1$, STOP.

ELSE set $A := A^2$, set $E_0 := E_1$ and go to Step 1.

Appendix 7: Pneumatic tube system

A pneumatic tube system is a distribution network which allows for rapid transport of goods through tubes of different sizes and lengths. The system operates with the suction or compression created by a blower unit.⁶³ The goods transported via such a system include cash, small Parts, documents, blood Specimens, laboratory samples, packing slips, keys, tools, mail .etc.⁶⁴

Among the applications of pneumatic tube system is cash handling in retail. In this way, cash can be transported to a secure cash center via a closed network which can eliminate traveling requirements for staff. The following are some of the benefits of this system.

- Safety: Continuous removal of excess money from check out points leads to
 - Maximum security for customers and staff
 - Prevention of criminal access
- Efficiency:
 - Reduced cash supply at cash registers
 - Faster reconciliation of receipts
 - Optimized cash logistics
 - Reduced labor costs⁶³

The ideal pneumatic system for cash handling is one that allows two way operations. A central location at the airport must be selected. The cash registers at different stores should be connected with this central location. Cash collected during transactions can be collected in containers (each having unique bar codes) and transferred the central cash office at appropriate intervals. In addition, change can also be provided through this system when required, resulting in lower cash holdings on premises. Figures 42 and 43 shows a two-way system that is considered to be useful at Amsterdam Airport Schiphol if all/ major retailers collaborate in cash handling.

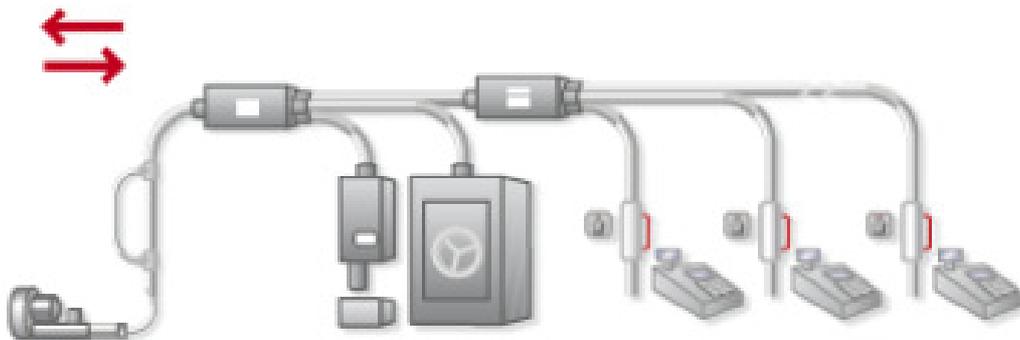


Figure 38: Two-way pneumatic tube system

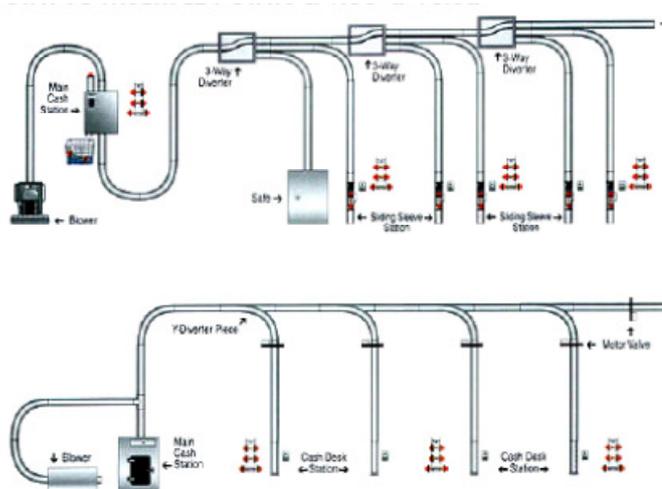


Figure 39: Two-way pneumatic tube system; point to multiple points and vice versa⁶⁵

Costs

Using a pneumatic tube system for cash handling at Amsterdam Airport Schiphol can reduce expensive costs of security systems, CiT costs, investment costs, labor costs and the overall back office costs.⁶⁶ Below some costs have been calculated for Kappe¹ and SAR.

❖ Separate costs

Kappe¹:

Staff costs^I: € 48k

Administration costs^{II}: 3470 hour per year*30 € per hour =€ 104k

Number of containers: 3 Containers per day per shop^{III}*12 shops*365 days= 13,140 container per year

Bank fees: 13,140 containers per year*3.25 € per container = € 43k per year + € 7k coin orders – €107k compensation = €-57k

SAR:

Staff costs: €23k

Administration costs: 1278 hour per year* € 32 per hour = € 41k

Number of containers: 3 Containers per day per shop*7 shops*365 days= 7,665 container per year

Bank fees: 7665 container per year*€3.25 per container =€ 25k per year + €7 k coin orders – €74k compensation =€ -43k

❖ Shared costs:

Central location rent: 30 sq. m^{IV}*600 euro per year per sq. m = € 18k per year

Investment= depends on the needs, number of workstations, system layout, and additional features demanded.⁶⁷

Sum excluding investment in tube system would be € 104k for Kappe¹ and € 30k for SAR.

The total costs cannot be estimated with the available data on the internet. Investment costs can be calculated by providing the required information to a supplier of pneumatic tube systems for a cost estimate. It is also possible to make estimates by knowing costs to other retailers who have installed

^I Calculated based on <http://www.airlinkint.com/Calculate>

^{II} Estimated based on estimations for alternative S4

^{III} It is assumed that one container is used for each shift at each store and then transported through the tube to the central cash office.

^{IV} It is assumed that a surface area of 30 square meters would be needed for the central locations.

the system and comparing the case at hand with them. If more retailers join Kappe' and SAR, these costs along with rent of cash office would be shared.