Certificate in International Cash Management

Sample course content

Chapter 2 Important cash management concepts

Contents

List of exhibits

Learning objectives

By the end of this chapter you will be able to:

- Understand the relationship between the operating cycle and the cash flow cycle;
- Evaluate the importance of liquidity and sources and uses of liquidity;
- Review important cash management concepts such as finality, availability and the time value of money;
- Analyse the supply chain process in terms of its effect on the corporate cash flow; and
- Understand why and where float occurs during the supply chain.

Overview

This chapter reviews many important concepts for cash managers including the operating cycle, the cash flow cycle, the nature of cash flows, the importance of liquidity, finality, availability and lastly, float; where it arises, what causes it and how to reduce it.

2.1 Introduction

An understanding of the basic concepts fundamental to cash management is necessary before continuing to more advanced topics. What is the relationship of the operating cycle to the cash flow cycle? How does cash flow differ from the bookkeeper's accounting entries? How does the concept of liquidity fit in and why is it important? What is the difference between availability and finality? What is float, how does it arise, how can it be controlled?

All these questions are answered in this chapter. Particular emphasis is laid on float. Traditionally cash managers have regarded float in the context of bank float, a very narrow definition. As treasurers start to become more involved in working capital management, however, it becomes apparent that float occurs throughout the supply chain and that in many cases the cash manager can have an impact on managing at least some parts of the supply chain float.

2.2 The nature of cash flows

Some of the greatest challenges for cash managers arise from the nature of cash flows and in particular:

Timing — As illustrated below in Exhibit 2.2, the timing of the operating cycle is such that outflows usually occur before inflows. The cash manager has to manage liquidity in the intervening period until the cash flows come in.

Mismatches — The outflows and inflows are not usually evenly matched. The cash manager has to manage the resulting surplus or deficit.

Fluctuations — Many businesses have seasonal cash flows, with the majority of revenues being concentrated during one or two periods of the year. While variable expenses may be adjusted seasonally, a certain level of fixed expenses still needs to be covered during periods when revenues are low. Again, the cash manager has to assure liquidity during all periods.

Predictability — Some cash flows are more predictable than others. (This concept will be discussed in more detail in Chapter 13 on forecasting) The unpredictability of some flows increases the challenge for the cash manager in daily cash positioning. Usually, cross-border cash flows are less predictable than domestic ones, and receipts less predictable than payments.

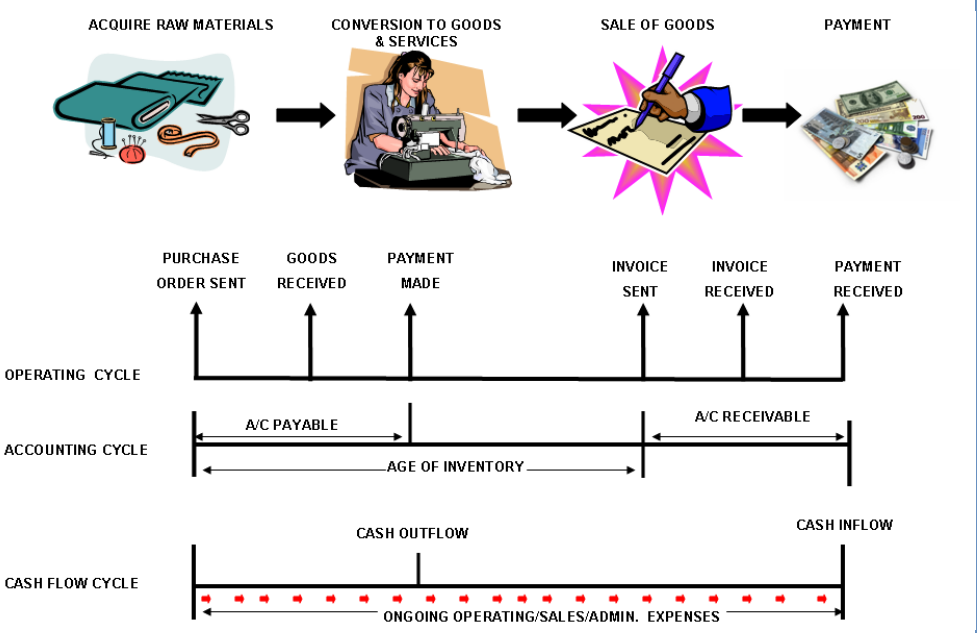
Currency — Not all cash flows are in domestic currency. This has implications for the cash manager in terms of timing, costs of processing and foreign exchange exposure.

Location — Cash flows are sometimes directed to or from geographically dispersed locations. This means that the cash manager has to take extra steps to relocate funds in order to manage liquidity efficiently.

2.3 The operating cycle and the cash flow cycle

For most companies the operating cycle begins with the purchase of raw materials, which are then converted into goods and/or services and ends with their eventual sale. Most companies use the accrual method for keeping their books, which means that the effects of expenses and sales are recorded as soon as they are contracted. The cash flows, however, usually occur at a different time. Exhibit 2.1 illustrates the relationship between the operating, cash flow and accounting cycles.

Exhibit 2.1: The operating, cash flow and accounting cycles



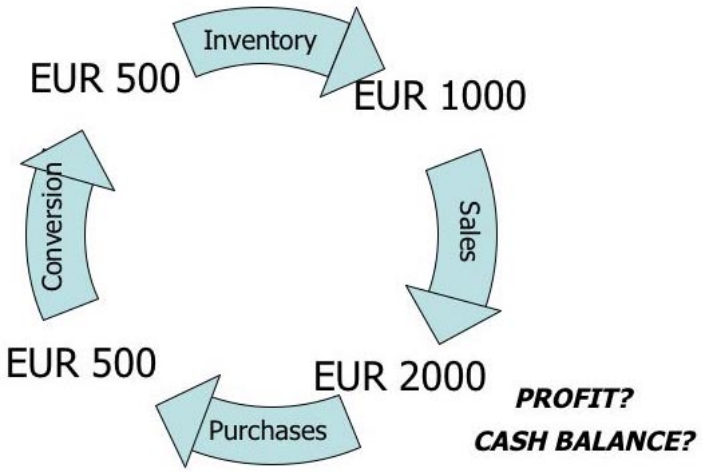
The cash manager's challenge is to fund the operating expenses until the cash inflows begin i.e. by ensuring that the company has sufficient liquidity to pay the bills. The time span of the operating and cash flow cycles will vary based on the industry. Some businesses have a short cycle, such as the fresh food industry, while for others, such as companies involved in manufacturing, it can be very protracted.

2.4 The importance of liquidity

'Liquidity is having sufficient cash to pay the company's short-term obligations when due.'

It is quite possible for a company that is solvent on paper (i.e. a positive net position of assets minus liabilities) to go bankrupt due to lack of cash. It is equally possible for an insolvent company, once it has bankruptcy protection, to remain liquid through ongoing business operations and the sale of assets. Exhibit 2.2 provides an example of the impact of timing on cash flows and resulting liquidity.

Exhibit 2.2: The cash absorber/generator



In the above example, what profit has the company made if it has purchased raw materials for EUR[1] 500, spent a further EUR 500 in converting them to products and sold the goods for EUR 2,000? The answer is EUR 1,000. The more difficult question is "what is the cash balance"? The answer depends entirely on the timing of the cash flows and could vary from – EUR 1,000 (if all expenses were paid before payment was collected) to +EUR 2,000 (if the goods were paid for in advance, before the materials and operating expenses were paid). The skilful cash manager will attempt to collect the proceeds of the sale before disbursing any funds. In reality, this is often difficult to achieve without jeopardising vendor, employee and market relationships. The cash manager's primary responsibility is to reduce the working capital gap (discussed in Chapter 4) i.e. minimising the impact of timing differences between inflows and outflows.

1 Throughout the manual currencies are indicated by their SWIFT currency code. See section 9.3.3 for details.

2.4.1 Sources and uses of liquidity

Sources of liquidity can be found internally and externally. For most companies internal sources are cheaper than external sources.

Internally liquidity can be found in:

- Pools of cash in the company. If these pools are in different currencies or geographically dispersed, it may be difficult to use these funds effectively.
- Ongoing operations and sales receipts.
- Selling the company's liquid assets.
- Improving collection methods.
- Reducing petty cash on hand and using other payment methods.
- Decreasing inventory.
- Decreasing the level of receivables.
- Increasing the level of payables.
- Maturing investments.

Externally sources can be generated from:

- Increased bank borrowing.
- Borrowing from the commercial paper (or similar short-term capital) market.
- Providing trade discounts to customers for early payment.
- Accelerating receipts from customers.
- Extending payment terms to suppliers.
- Adding shareholders.

Similarly, users of liquidity include:

- Ongoing business expenses.
- Operating losses.
- Increasing inventory.
- Reducing payables.
- Increasing receivables.
- New investments.
- Capital expenditures.
- Payment of dividends.
- Repayment of debt.
- Interest payments.
- Tax payments.

The concept of working capital and what the cash manager can do to improve liquidity by managing the company's current assets and liabilities is discussed further in Chapter 4.

2.4.2 The cost of liquid assets

'A liquid asset is one that can be quickly and easily converted into cash without significant loss of value.'

Having too much liquidity may mean that the company is keeping too much in low earning assets and either incurring an opportunity cost by not investing in higher earning assets, or a real cost by borrowing to support them.

The costs of keeping too little liquidity, however, range from trivial to significant. In ascending order of magnitude they are:

- Using more expensive payment methods because payments are late and need to be made more urgently.
- Additional penalties and fees for late payment.
- Paying higher costs for unanticipated borrowing.
- Missing opportunities to take trade discounts.
- Lost business opportunities due to lack of liquidity.
- Legal fees in defending lawsuits for non-payment.
- Long-term impact of a tarnished business reputation.
- Interrupted operations and inability to replace inventory.
- Defections by customers and suppliers.
- Bankruptcy and/or liquidation.

2.5 Other important cash management concepts

The following sections define and describe other concepts that are important to understanding cash management.

2.5.1 Availability

'Availability is the time at which a company will have access to funds that have been deposited at the bank.'

Because of the collection process this may take a few days, or, in the case of international collections, several weeks. Availability, however, does not imply finality. Although funds have been made available, the bank may still withdraw them at a future date should the deposited item fail to settle.

2.5.2 Finality

'Finality is the time after which a payment is considered to become irrevocable and cannot be returned without the permission of the beneficiary account holder.'

It is important to establish when finality of payment occurs so as to limit the:

- Risk of non-payment, i.e. the risk that an item is recalled by the originator or the originating bank (e.g. a stopped cheque).
- Unnecessary loss of value in both the collection and the payment cycle.

It should be noted that finality varies by instrument and from country to country. Finality may be immediate, weeks or months, and in certain circumstances (usually for consumer direct debits) may be infinite.

2.5.3 Value

The following are definitions related to the concept of value.

Value	The moment when funds cease to be useable to the originating party and instead become useable funds to the beneficiary in the sense that they can reduce overdraft balances, earn interest or be withdrawn.
Value-dating[2]	The practice of dating a customer transaction at some date other than the date at which the bank itself lost or gained value. It is used by banks in some countries as a method of compensation. It can be applied to all methods of payment both forward and backward in time.
Forward value-dating	The time between a bank being notified of a transaction in favour of a customer and the customer receiving future value for the item.
Back value-dating	The time between a bank being notified of a transaction to the customer's account and the item being valued on a date prior to the date of the transaction.

An example of forward value-dating is when a bank collects value for cheques which clear in five days, but does not give value to the customer until day six.

2 Value dating, especially back valuing, also occurs when banks have to adjust availability dates to correct for operational errors. When used in this manual, value dating refers to the bank practice of using value dating as a method of compensation.

An example of back value-dating is when a bank processes an outgoing payment request on one day but values the debit to the customer's account to a prior value date. Banks also back value transactions to correct errors or upon negotiation with customers.

Although there is evidence that the practice of value-dating as a method of bank compensation is falling out of favour it is still widely used in Europe and can also be found in other parts of the world. Value-dating is not to be confused with 'availability' which is the date at which the customer may use the funds. Availability may or may not include value days as additional compensation for the transaction. (Value-dating will be revisited later in this chapter and again in Chapter 11.)

As an example of the difference between 'value' and 'availability', when interest is earned on a current account, a bank may agree to accrue interest from the day of deposit, i.e. the deposit has been given *value* immediately. *Availability*, however, i.e. the date at which the funds may be withdrawn, may not be given until the clearing cycle has been completed and the funds are final.

2.5.4 Security of principal

While there may be people within the company assigned to take risks and improve returns, that is not the role of the cash manager. An overriding consideration for the cash manager in performing the role is at all times to safeguard security of principal.

2.5.5 The opportunity cost of funds

'Opportunity cost is the cost of an alternative use of funds that is foregone.'

Cash in a bank account earns little or no interest. To the extent that alternatives are available such as paying down debt or investing at a higher rate of return, there is an opportunity cost to the company i.e. the cost of the opportunity lost or not taken. The cash manager uses the concept of opportunity cost when quantifying the cost of inefficient cash management practices or in weighing up benefits and potential savings of new products and services.

2.5.6 Time value of money

The time value of money is the concept that money received today is more valuable than money received in a day or two's time on the premise that if received today, it can be invested and so is worth more tomorrow. Cash managers use this concept in a number of different ways:

Assessing the opportunity cost of float on collections	Cash flows that are delayed in the collection process cost the company money either through lost investment revenue or borrowing costs to cover liquidity requirements.
Assessing the opportunity cost of float on payments	What is the impact of paying electronically and conceivably losing disbursement float? What is the benefit to using slower methods of disbursement?
Assessing the value of trade discounts	Is taking a trade discount and paying earlier going to be more beneficial than delaying the payment until the due date?
Assessing the value of a new product or service	Will the cost of a new service to accelerate collections, or control payments, produce benefits in excess of the costs of the service?
Assessing investment alternatives	When faced with a number of different investment opportunities, with yields computed on a different basis, determining which one represents the best option.
Assessing the value of capital projects	When making investment decisions, calculating if the future projected return from the project exceed the present day value of the initial cash outflow.

2.6 Float

There are many definitions of float. The one most commonly used is the one for bank float which is defined as:

'The time lost between a payer (or payor) making a payment and a beneficiary receiving value.'

Traditionally bank float was the only area of float that the treasurer considered. So much emphasis has been placed on reducing bank float, particularly in the U.S., over recent years that it is now measured in hours rather than days.

As treasurers' responsibilities widen to encompass the management of working capital, it becomes increasingly obvious that bank float is the tip of the iceberg and that many other aspects and different kinds of float need to be considered.

Consider a normal transaction between two companies involving company A ordering goods from company B. The chain of events from the supplier's standpoint is as follows:

- Order received.
- Goods dispatched.
- Invoice issued.
- Credit period.
- Payment due.
- Payment made.
- Payment received.
- Payment banked.
- Funds available.
- Funds moved to concentration account.
- Advice of funds availability.

An analysis of this flow in more detail enables the float and cash flow aspects to be identified. In the following example, the assumption is that payment is made by cheque. Even if using more efficient methods of payment many of the float issues that are discussed below still apply.

2.6.1 Order received and goods dispatched

When an order for goods is received there are a number of ways in which it can be fulfilled:

Scenario I The goods are in stock – so they can be immediately dispatched.

Scenario II The goods need to be manufactured. The following are all available:

- Raw materials.
- Machinery to produce goods.
- Labour.

Scenario III The goods need to be manufactured BUT

- Raw materials may need to be ordered.
- Machinery to produce goods may be fully occupied.
- Labour may be fully occupied.

The time between receiving the order and dispatching the goods, therefore, can vary quite considerably, depending on the circumstances. This is known as '*production float*'.

It is also apparent that each scenario has different working capital management implications.

Scenario I necessitates keeping a high level of inventory on hand, the production costs of which have already been incurred and may have been paid for (i.e. production staff, salaries, machines, premises, lighting, heating, etc). The cash has already been paid out awaiting a cash inflow in respect of sales. Having the goods in stock results in a quicker response to the customer and enables the supplier to generate an incoming cash flow faster than having to manufacture to order, but requires a heavy cash outflow first.

Scenario II means that although raw materials have been purchased, no manufacturing costs have yet been incurred so there has been less of an outlay of cash to date. If the goods can be manufactured quickly, the time between order and dispatch can be minimised and the difference between cash paid out and cash received can also be minimised.

Scenario III is much more complicated. Although the company may have incurred no costs at all as far as the order is concerned, the time between receiving the order and dispatch could be considerable. In today's fast-paced world, long lead times may not be acceptable.

Different industries have different policies in this respect. If you need a battery for a delivery vehicle, you expect it immediately. If you are ordering a specialised generator set costing EUR 500,000 then you might expect production float to be several weeks.

2.6.2 Invoice issued

Once the goods have been dispatched an invoice needs to be sent to request payment. Most companies will not pay before receiving and agreeing a formal request for payment in the form of an invoice or statement.

The exact mechanism that triggers production of an invoice varies from company to company, but the time between dispatch of goods and the issuance of an invoice is known as '*system float*'. The delay between dispatch of goods and invoice production is totally under the control of the supplying company. In practice, some companies have invoicing policies such as:

- 'Invoice once per week on a Thursday.' This means goods dispatched on a Thursday will not be invoiced for seven days.
- 'Invoice once per month on or near to the 8th.' This means that goods dispatched on 8 January will not be invoiced until 8 February.
- 'Invoice immediately that goods are dispatched.' This means that as soon as the goods are on the truck an invoice is generated.

Obviously, there are cash flow and float implications associated with each of these policies.

2.6.3 Credit period

The terms of the agreement will specify what credit period is being accorded the customer and will, therefore, determine when payment is due. Credit periods often start from the invoice date, not the dispatch date. Float is incurred as a result of the credit period. Companies need to question whether the credit period is necessary, can it be shortened and does the invoice specify method of payment and provide all the details so that payment can be effected via the most expeditious method?

The delay between the issue of an invoice and the payment-due date is the '*credit period*'.

One way to speed up receipt of payment, other than to shorten the credit period, is to offer a discount for early payment. The rate of discount needs to be considered carefully both by the buyer and the seller (see section 4.4.3).

2.6.4 Payment due

Payment becomes due when the credit period has expired, but the buyer still may not pay on time. It is possible that the buying company has ignored the payment date because of its own payment policy. For example, it may have only two cheque runs per month on the 15th and the 30th. If the payment due date is the 8th the company is effectively taking one extra week's credit. This is known as '*customer float*'.

2.6.5 Payment made

Finally, the payment is dispatched. If the payment is made by cheque, mailing times vary from country to country. In the UK, domestic mail takes a theoretical maximum of 2 days. In the U.S. domestic mail can take up to 5 days. In countries such as Greece it can add nine days while in others it may take weeks. In all cases mail can be delayed by inaccurate addressing or even be lost in transit. '*Postal float*' can be a major factor in adding float time to the process. In the U.S. this is called '*mail float*'.

2.6.6 Payment received

Once received, the time between receipt of the cheque and depositing it in the bank is totally under the control of the supplier. Some companies are very poor at banking payments and may only go to the bank weekly. Others may deposit by mail (incurring more postal float) or process the internal bookkeeping entries before banking the payment. This represents further '*system float*'.

2.6.7 Payment banked

Now that the cheque is in the payment system the bank will undertake the process of collecting the funds. '*Bank float*' relates to the period an item takes to clear once it enters the banking system. In some countries domestic clearing takes two or three days while in some Asian countries it might take 14 days. Collecting a foreign currency cheque (see Chapter 7) takes much longer and incurs substantially more float, costs and possibly foreign exchange exposure.

2.6.8 Funds available

If the supplying company, based in the U.S., is paid by cheque in SGD and the cheque is sent for deposit to an account in Singapore, how does the company know when funds become available? It can either use an electronic balance reporting system, if one is available, or await receipt of an advice. Again, this may be sent electronically or by mail. An additional problem remains, however, in that even though the funds are available they are in an account located in Singapore and in a foreign currency. So to be able to effectively use the funds the funds will need to be converted into USD and remitted to a concentration account in the U.S. This is known as 'concentration float'.

2.6.9 Funds moved to concentration account

Once the funds are moved to the concentration account, the supplier still cannot use them until it is advised of their receipt. This is known as '*information float*'. Systems such as electronic account reporting can be used to reduce this.

2.6.10 Advice of funds availability

Finally, only when the advice arrives does the supplier have use of cleared funds in its bank account.

The process and the stages of float are summarised in Exhibit 2.3.

Exhibit 2.3: Stages of 'float'

Stage in process	Name of float*	Responsibility
1. Order received to Goods dispatched	Production float	Supplier
2. Goods dispatched to Invoice issued	System (invoicing) float	Supplier
3. Credit period to Payment due	Credit period	Supplier
4. Payment due to Payment made	Customer float	Buyer
5. Payment made to Payment received	Postal (mail) float	Buyer/postal service
6. Payment received to Payment banked	System (processing) float	Supplier
7. Payment banked to Funds available	Bank (availabilty) float	Banks
8. Funds available to Funds concentrated	Concentration float	Banks
9. Funds concentrated to Advice of availability	Information float	Banks

** The name of float most frequently used in the U.S. is given in parentheses*

Float is, therefore 'inefficiency' in the business cycle. If you are the buyer, float accrues to your advantage. If you are the supplier float is a cost to your business. Float has both benefits and costs, but generally the cost to one party is to the benefit of the other party or the bank! The cost/benefit of float can be quantified using the following formula:

$$\text{Cost/benefit of Float} = \text{Amount due} \times \times \frac{\text{No. of days}}{360 \text{ or } 365^{3}} \quad \text{Cost of funds}$$

Cost of funds refers to either the marginal cost of borrowing the funds for the period of float, or the lost opportunity cost of funds.

2.6.11 Why does float arise?

Float occurs for two reasons; normal business practices and inefficient company processes. Many things can be done to reduce float once it has been identified. Recognition of sub-optimal float management should be a major part of any cash management review.

3 The year basis depends on local convention. This manual will use the convention of 365 days for GBP and 360 days for any other currency unless specifically mentioned.

Concentrating on the financial aspects, float may be caused:

- Deliberately by the buyer:
  - Late payment.
  - Wrong instrument issued (e.g. USD cheque drawn on UK bank sent to U.S. beneficiary – often called a 'triangular cheque').
  - Using a slow payment method.
- Through inefficiency of the supplier:
  - Late or inaccurate submission of invoices.
  - Processing internal transactions before depositing payment.
  - Resolving discrepancies and disputes before depositing the cheque.
  - Incorrect or incomplete payment instructions.
  - Invoicing in wrong currency.
  - Using inefficient collection methods.
- Due to logistical situations:
  - Clearing process.
  - Postal process.
  - Standard business practice to take float (e.g. Spain/Italy).
  - Foreign exchange regulations holding up cross-border payments.
  - Banks not passing on value received.
  - Central Bank reporting.
- As a result of compensation mechanism:
  - Taken in lieu of a specific charge.
  - Taken as a hidden extra charge.
  - Taken in addition to transaction fees.

2.6.12 How to reduce float

- Change internal systems:
  - Invoice immediately on dispatch of goods.
  - Integrate invoicing with dispatching system.
  - Deliver invoice electronically or via the Web.
  - Renegotiate/reduce credit periods.
  - Invoice in correct currency.
  - Encourage electronic payment by quoting bank account details on invoice, (including, where appropriate, IBAN, BIC or other numbers, see Chapter 9).

- Change customer behaviour:
  - Offer discounts for prompt settlement.
  - Introduce direct debiting (becoming very common in certain countries in Europe).

  - Provide clear payment details – bank code, account number, transfer method preferred and value date that payment is expected.
  - If cost-effective, enclose an addressed return envelope.

- Include float costs in price and/or terms:
  - Possible in some countries/industries, but may impact competitive position.
  - Impose penalties for late payment.

- Negotiate float with banks:
  - Seek to replace compensation by float with a fixed fee.
  - Structure bank accounts to collect more efficiently (e.g. if receiving EUR denominated cheques drawn on banks in France consider opening an account in Paris).
  - Negotiate reduced value days with bank.

Banking services that have been specifically designed to manage float are discussed in more detail in Chapter 6. Chapter 4 on working capital management also reviews courses of action for reducing float and improving a company's liquidity.

Summary

- The nature of cash flows presents challenges for the cash manager, they are mistimed, mismatched, irregular, and sometimes unpredictable, in a foreign currency or different location.
- Because cash outflows usually occur before cash inflows the cash manager has to ensure that the company has enough liquidity in order to pay its short-term obligations when due.
- There are many sources and uses of liquidity, both internal and external.
- There is an opportunity cost to having too much liquidity and consequences ranging from minor to severe of having too little liquidity.
- Float can occur at many points during the transaction cycle. Usually float benefits the buyer and disadvantages the supplier.
- The cost of float can be quantified and a number of steps can be taken to reduce it at various points along the supply chain.

Self-assessment questions

Question 1

What is it about the nature of cash flows that creates a challenge for the cash manager?

Question 2

Where can the company find sources of liquidity?

Question 3

What are the costs of maintaining too little liquidity?

Question 4

Describe value-dating

Question 5

What is finality of payment?

Question 6

What is bank float and how is it calculated?

Question 7

What are the four main reasons why float occurs?

Self-assessment answers

Question 1

What is it about the nature of cash flows that creates a challenge for the cash manager? (Section 2.2)

The nature of cash flows can prove very challenging for a cash manager in the following ways:

- Timing.
- Mismatches.
- Fluctuations.
- Predictability.
- Currency.
- Location.

Question 2

Where can the company find sources of liquidity? (Section 2.4.1)

Sources of liquidity can be found internally and externally. Most companies find that internal sources are cheaper than external sources.

Internally liquidity can be found in:

- Pools of cash in the company. If these pools are in different currencies or geographically dispersed, it may be difficult to use these funds effectively.
- Ongoing operations and sales receipts.
- Selling the company's liquid assets.
- Improving collection methods.
- Reducing petty cash on hand and using other payment methods.
- Decreasing inventory.
- Decreasing the level of receivables.
- Increasing the level of payables.
- Maturing investments.

Externally sources can be generated from:

- Increased bank borrowing.
- Borrowing from the commercial paper (or similar short-term capital) market.
- Providing trade discounts to customers for early payment.
- Accelerating receipts from customers.
- Extending payment terms to suppliers.
- Adding shareholders.

Question 3

What are the costs of maintaining too little liquidity? (Section 2.4.2)

The costs of keeping too little liquidity, however, range from trivial to significant. In ascending order of magnitude they are:

- Using more expensive payment methods because payments are late and need to be made more urgently.
- Additional penalties and fees for late payment.
- Paying higher costs for unanticipated borrowing.
- Missing opportunities to take trade discounts.
- Lost business opportunities due to lack of liquidity.
- Legal fees in defending law suits for non-payment.
- Long-term impact of a tarnished business reputation.
- Interrupted operations and inability to replace inventory.
- Defections by customers and suppliers.
- Bankruptcy and/or liquidation.

Question 4

Describe value-dating (Section 2.5.3)

Value-dating is the practice of dating a customer transaction at some date other than the date at which the bank itself lost or gained value. It is used by banks in some countries as a method of compensation. It can be applied to all methods of payment both forward and backward.

Question 5

What is finality of payment? (Section 2.5.2)

Finality of payment is the time after which a payment is considered to become irrevocable and cannot be returned without the permission of the beneficiary account holder.

Question 6

What is bank float and how is it calculated? (Section 2.6.11)

Bank float is the time lost between a payor making a payment and a beneficiary receiving value.

Float is calculated using the following formula:

$$\text{Cost of Float} = \text{Amount due} \times \frac{\text{No. of days}}{360 \text{ or } 365} \times \text{Cost of funds}$$

Question 7

What are the four main reasons why float occurs? (Section 2.6.11)

Float occurs for the following reasons:

- Deliberately created by the buyer.
- Inefficiency of the supplier.
- Logistical situations.
- As a compensation mechanism.