

 <p>ASIA PACIFIC . UK . US . OCEANIA www.microplanning.com</p>	<p>How projects connect to company success or failure and the role for planning and control</p> <p>By Professor Russell Kenley Professor of Management, Swinburne University of Technology Visiting Professor of Construction, Unitec NZ rkenley@swin.edu.au</p>	
---	--	---

Abstract

Working capital is fundamental to the operation of any business. Construction companies derive their working capital through projects. It is therefore important to understand the connection between project planning and control and the firm's working capital. The management of working capital determines whether companies succeed or fail.

There is a relationship between the money that flows into a project and the money that flows out. This is called net cash flow. Across an organisation, these individual project net cash flows compound to build the organisational cash flow. When problems start to occur, the organisational cash flow can become unsustainable even through projects may appear to be making money.

While the main management issue, at the firm level, preventing a path to disaster is maintenance of positive working capital, many firms get in trouble through a small number of bad projects. This often arises through poor project planning and control. A big enough problem, or a series of smaller problems, can place a firm in an unrecoverable position.

To prevent disaster, greater emphasis must be placed on firm level control of projects and less on the project manager's responsibility. Thus better and more rigorous planning, control and forecasting systems should be centrally mandated and monitored. This is the key to moving from Risk to Reward.

Keywords: Construction Management; Cash flows, Cash Farming, Project Control

How projects connect to company success or failure and the role for planning and control

Trade sources of Working Capital

Working capital represents the funds required to undertake business. In construction, this typically means the funds required to establish projects and maintain cash flow during the life of each project. However, working capital represents more than merely maintaining project operations, it also allows new investments, cross subsidies (such as covering losses), new business ventures and indeed speculative investments.

Organisational working capital comes either from external sources, such as shareholder funds (equity), loans such as overdrafts (liability) or surplus cash generated through operations (assets). These seem simple enough, but there is another category, a hybrid, which may trap the unwary builder. This is the surplus funds generated, not through profit, but through the timing of payments allowing accrual of funds at bank but committed to sub-contractors or suppliers. This is actually credit being extended by suppliers and subcontractors, sometimes known as 'trade credit'. Through trade credit, one project which provides surplus funds may support another project which may be in the early stages and therefore demands funds.

Organisational cash flow management is fundamental to any business and construction is no different. The true task of a successful construction company is not, as often believed, to manage individual projects, but rather to successfully manage a portfolio of projects. However, this requires that individual projects be managed in alignment with organisational needs which may be in conflict with the perceived needs of the project.

The project schedule, and the management of activities and tasks which impact on the cash flow of the project, can therefore have a critical impact on the organisation.

Gross cash flow

Construction project cash flows are a sub-set of cash flow for the organisation. Construction project cash flow is the inflow of cash to the contractor from the client, and also the outflow of cash to the suppliers, sub-contractors and to direct costs.

As the project progresses, the contractor commits to work in progress (WIP). There is a direct correlation between the WIP curve and the curve of each of the inward and outward cash flows (refer Figure 1).

The client-oriented flow of cash from the client to the contractor generally flows in from the client in periodic payments called ‘progress payments’. Building contracts generally provide for such payments for two reasons:

- To provide a mechanism whereby the contractor may recover money for work in progress, so that the contractor is not funding the project; and
- To restrict these payments to set periods (usually of one month) in order to reduce the amount of administration required by all parties.

Cash flow in from the client may therefore be seen as being a series of lump sums, usually at intervals of one month, with no payments received in between.

The flow of cash out to suppliers, subcontractors and direct costs is very different to the inward flow from the client. These payments follow the disparate contracts and agreements that exist between the contractor on one hand and subcontractors and contracted suppliers on the other, and also occur on an as required basis as labour and materials are called up and used during the construction of the project.

- Payments may be made daily, such as purchases from local stores, weekly as wages or payments for goods on seven-day terms such as concrete or reinforcing steel, or monthly for subcontracts. At the end of the month many of the subcontractors and suppliers will be eligible for payment.
- Outward cash flow may be seen as an almost continuous (but variable) series of small lump sums, with a concentration about the end of the month.

Net cash flow

The net cash flow for a project is the difference between the money flowing in to the contractor and the money flowing out. The important issue is the relative timing of the two flows. The timing is not only important in the consideration of net cash flow, but is critical to understanding the financial performance of construction companies. Figure 3 displays the idealised path from commitment through outflow and inflow to net cash flow.

Most net cash flow models assume that there is a direct and constant relationship between the commitment curve and the corresponding inward and outward curves. Construction planners tend to adopt this view when they plan schedules to model cash flow. It is a very convenient approach, as it only requires that the cash flow of the commitment be derived by plotting the cumulative distribution of the cost loaded schedule. Unfortunately, the model is invalid, as real projects suffer extreme variations in the net flow profile depending on the relative timing of the inward and outward flows. In practice, these may be accidentally or deliberately manipulated.

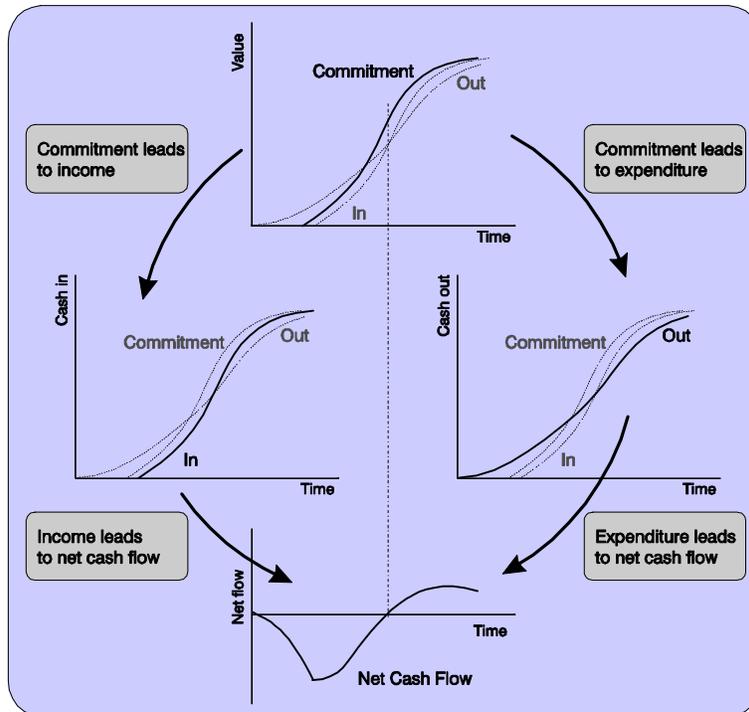


Figure 3: The source of net cash flow
 Source: Kenley, 2003–Figure 6.3

Figure 4 provides shows the wide range of net cash flow curves found on real projects.

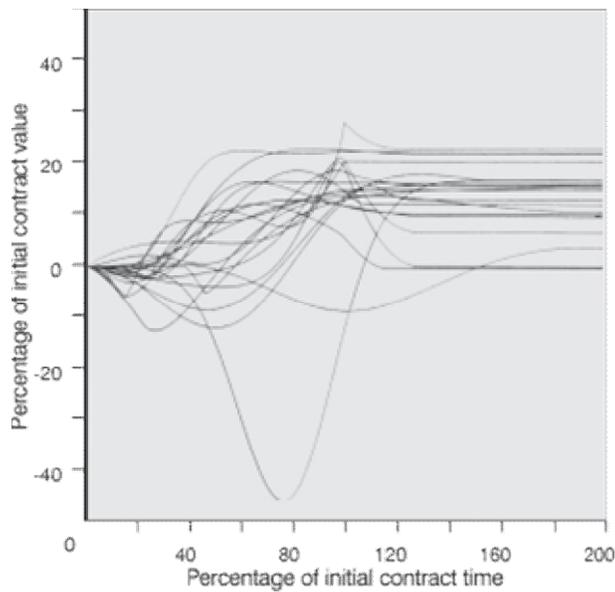


Figure 4: Multiple net cash flow profiles showing wide variation in form
 Adapted from: Kenley, 2003–Figure 6.19

Figure 5 shows six projects and how the cash flow data points have been used to derived trend line curves. These projects were all from one contractor and were supposed to have similar cash management strategies. In reality there was a great deal of variation between projects.

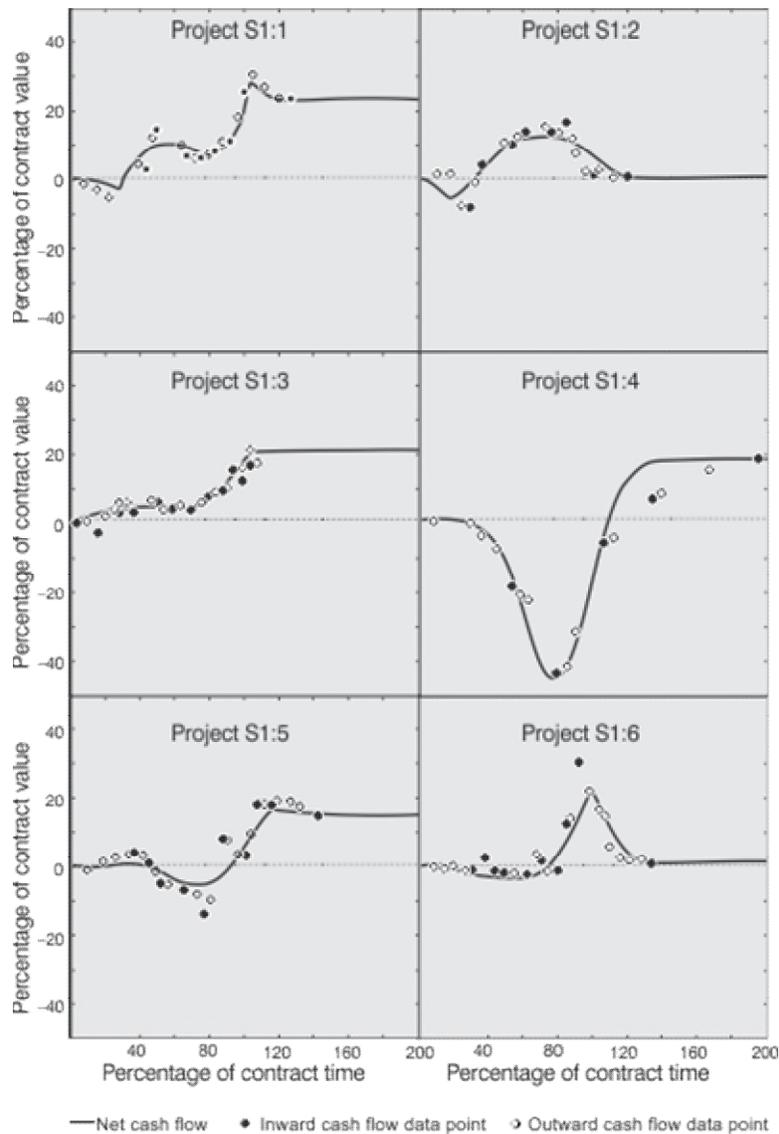


Figure 5: Examples of project net cash flow data and lines of best fit
Kenley and Wilson, 1989

The difference between the projects is driven by differing timing of payments. Project 1 maintains positive cash flow and a healthy end margin. Project 2 has a healthy cash flow but a zero end margin. Projects 3, 4 and 5 have poor cash flow and good end margin. Project 6 has an erratic cash flow and poor end margin.

The project team must consider both the end margin **and** the way it is derived through the cash flow profile, as this represents the demand or contribution to working capital.

Organisational Cash Flow

Organisational cash flow is the next step on from net cash flow. Organisational cash flow can be seen to be constructed by a portfolio of project net cash flows. This is illustrated in Figure .6.

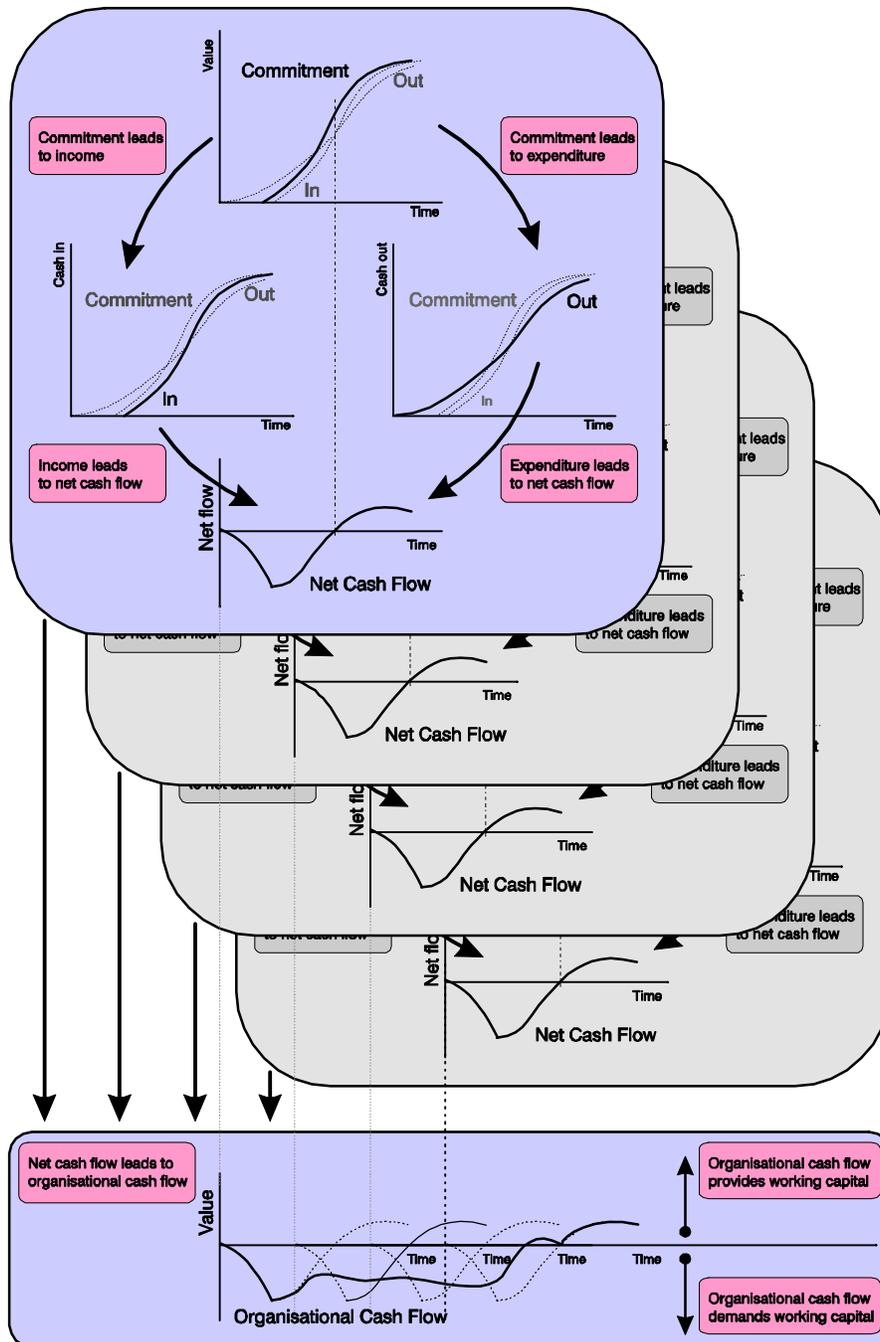


Figure 6: Theoretical representation of organisational cash flow
 (Source: Kenley, 2003–Figure 7.1)

The portfolio view considers the cash flow of the organisation to be constructed from a series of overlapping individual net cash flows. Where they overlap, they accumulate, the net inward cash flow on one project countering the net outward cash flow on another. This is an important

concept in traditional construction management. It is very common for the early phases of a project to require subsidy funding. This can be offset by the positive balance of another project reaching completion, thus maintaining corporate liquidity.

Organisational cash flow reflects the business culture of the organisation. A traditional, conservative firm will operate with a different form of organisational cash flow from a modern, more aggressive organisation. A company can be aware of its position and manage its cash flow in a strategic manner, or it can be unaware and run its cash flow as an incidental occurrence, being focussed solely on the project margin.

It is a common situation for small builders to be limited to one project at a time through the inability to raise further finance for a second project. The same can occur at the opposite extreme, where a successful company can reach the point where they cannot afford to win further projects until some of the existing workload is completed and the financial demands are reduced. Projects run with this form of net cash flow profile have an overall negative impact on the total organisational cash flow.

A preferable approach to managing projects results in income either starting first (which may be difficult) or at least as soon as possible after expenditure has started, thus reducing the delay before income commences and the consequential demand which the project places on organisational working capital. Only small changes are required to drive the project in such a way that the project becomes a funds contributor, as net cash flow curve profiles are very sensitive to project gross cash flow conditions.

Strategic cash flow and Cash farming

Strategic management of organisational cash flow requires balancing competing demands for resources. These demands can come from different divisions, or from non-core activities.

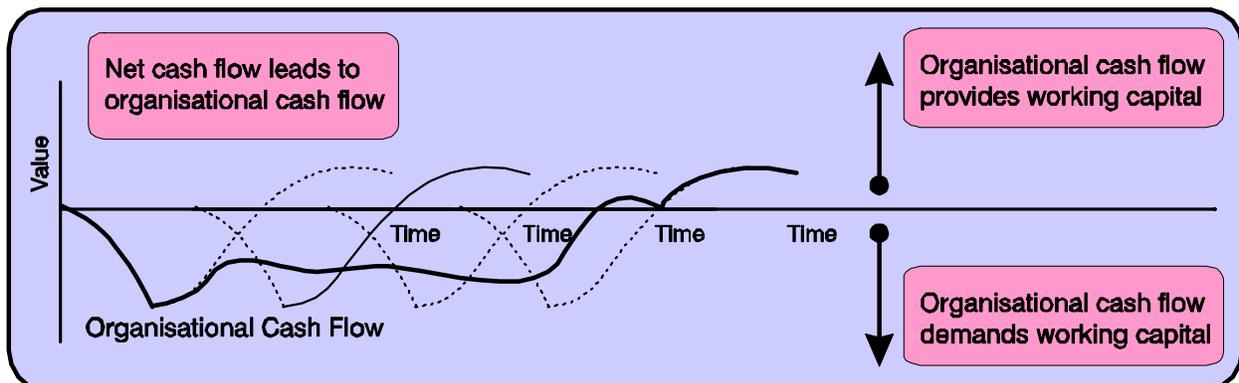


Figure 7: Overlaying net cash flow profiles to form an organisational cash flow
(Source: Kenley, 2003–Figure 7.5)

The impact of these different approaches is seen when an organisation is running a portfolio of projects. In those circumstances the ability of the organisation to take on new projects, to fund those projects and to continue to fund its normal operations, becomes paramount.

Done well, this improves competitiveness. The biggest and best managed contractors manage their cash flow well. It can be argued that this is the key to their success.

Done poorly is cash farming. This is often associated with failure.

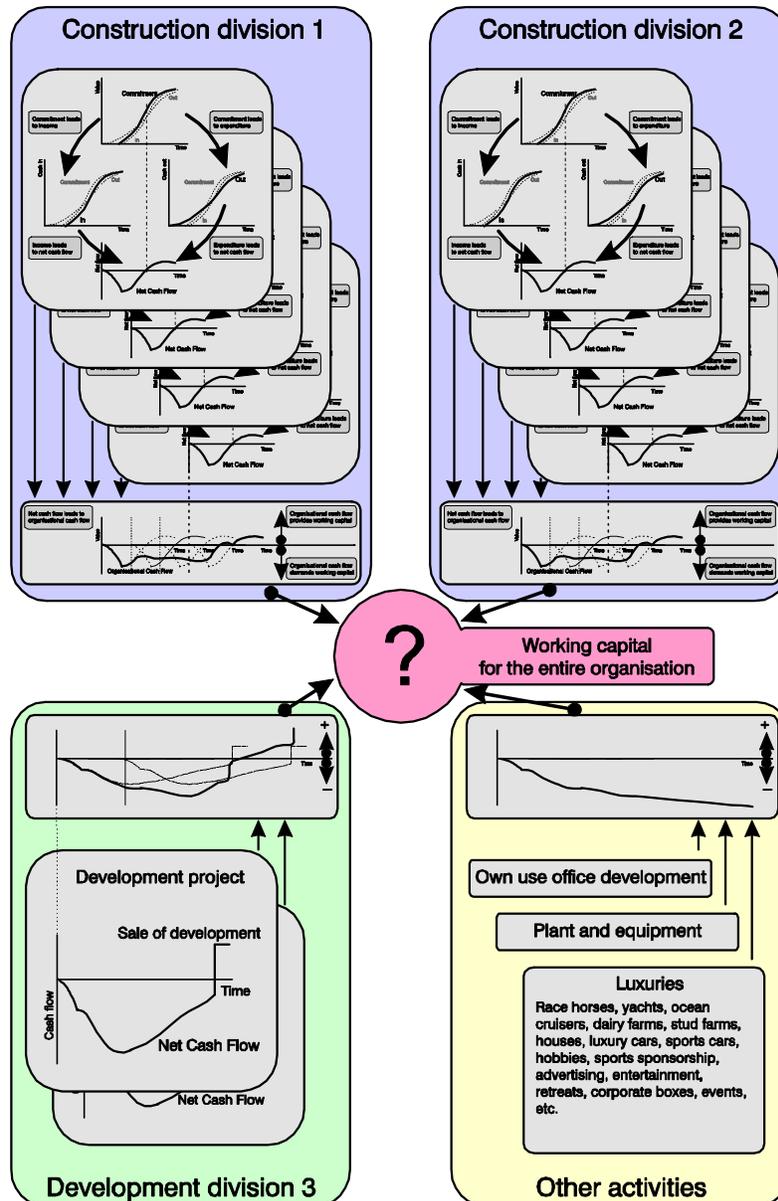


Figure 8: Working capital and operations
(Source: Kenley, 2003–Figure 8.1)

Cash farming is a term used by Gyles to describe a particular cash management strategy identified by the New South Wales Royal Commission into productivity in the building industry (Gyles, 1992). Such a practice was observed to have often been associated with company failure.

The practice has therefore become blackened, as it is publicly associated with failure and not acknowledged by successful firms.

Cash farming is an analogy deliberately used to describe an important issue for those wishing to engage in the management of a construction business, the strategic management of organisational cash flow. The term ‘cash farming’ has been used deliberately to draw out the implied meaning of the deliberate exploitation, to derive benefit, of the fallow field of construction cash flow. It is the milking of the cash cow. And, to stretch the analogy to breaking point, just as a real farmer can use and abuse the land, so can we see good and bad farm management practices at work in construction.

A construction company operating within normal contractual terms, and paying bills on time (but to the strict contract terms), and not doing anything to manipulate the timing of payments, is able to achieve:

- Minimum funds in bank of 10% turnover, to as much as 20%.
- Maximum funds in bank of 20% turnover, to as much as 30%.

Although the funds generated fluctuate wildly during projects, and from month to month, contractors can become confident (complacent) about the presence of positive funds. They conclude they have become a very profitable business.

The process here takes two forms depending on the knowledge or needs of the contractor:

1. Knowledgeable contractors who understand their cash flow position in detail would understand that none of the funds generated belonged to them. In this situation they would be aware that as projects wind down, they will be required to meet their commitments. They will make provision by either leaving the funds untouched, or more likely, ensure that any re-investment is easily liquidated or replaced in the event of a change in circumstances. Let us call such an organisation the ‘*Aware Firm*’.
2. Less knowledgeable contractors, or those whose needs or greed outweigh their common sense, are likely to not have detailed understanding of their cash flow position and have no ready explanation for the funds generated. In this situation they would be surprised at the state of their bank account, they would be delighted with their success, they might believe that, even if not all is profit (what a nice idea though), that at least a significant proportion is their return for all the hard work they have put in—after all they are a competent, well respected, firm. Let us call such an organisation the ‘*Surprised Firm*’.

The Aware Firm is in a powerful competitive position, able to take advantage of their knowledge to deliver added value to their organisation. The Surprised Firm is in a weak position and highly likely to suffer business failure.

Path to success

A firm which recognises that surplus funds are trade credit and therefore committed, can invest in other aspects of its business or consider additional investments, providing it maintains a safety buffer.

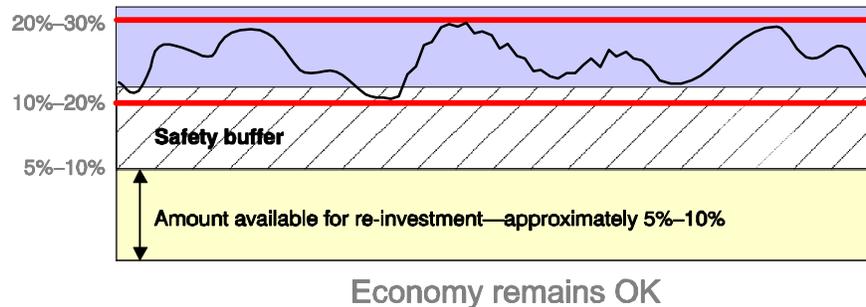


Figure 9: Organisational cumulative cash flow in happy circumstances
Source: Kenley, 2003—Figure 8.5

In the event of an economic downturn, or if there are bad projects or project delays, the buffer will ensure that the company has time to act before conditions cause company failure. Actions might include selling investments in a realistic and non-fire-sale fashion.

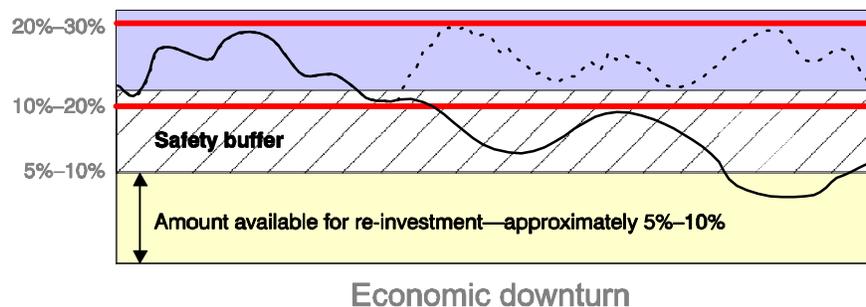


Figure 10: Surviving a downturn
Source: Kenley, 2003—Figure 8.13

Path to failure

The suite of practices described by the term cash farming are endemic in the industry and company failure results from perpetrators being unable to accommodate changes in their financial circumstances. There are four factors at work in the path to failure:

1. An initial shortage in capital.
2. Funds for operations are derived from projects.
3. The funds available from operations are reallocated to either paying out losses or reinvested in non-liquid assets; and

- There is a reduction in supply of cash flow, usually caused by a slowdown in supply of projects or delays in their execution.

The company may find that there is money in the bank and not be able to differentiate that this money is actually trade credit.

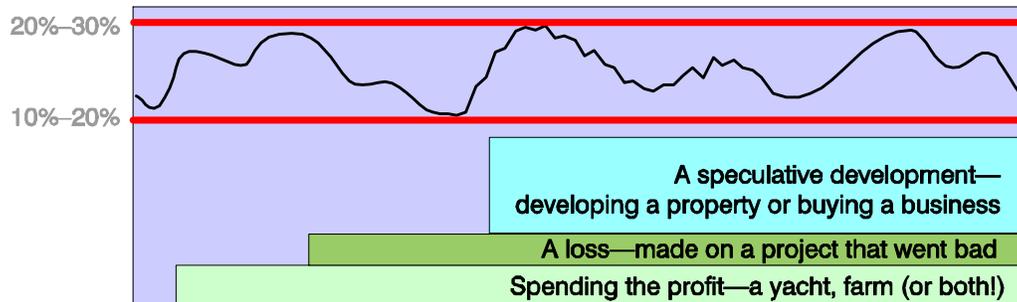
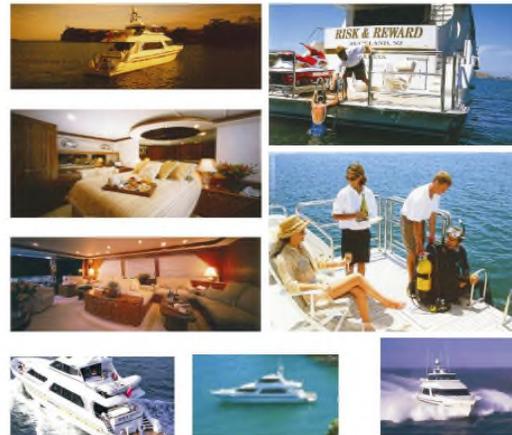


Figure 11: Spending with complacency
 Source: Kenley, 2003—Figure 8.6

The Surprised Firm does not fundamentally understand where their, sometimes considerable, money comes from. (This may be a gross over-simplification, however, elements of the following illustrative tale apply in many cases). The Surprised Firm may consider the money as profit (which it is not). In this case they may, progressively, use that resource for other needs. It might then spend it. 15% of turnover might be available... on \$2b turnover this equates to \$150m. Such expenditure might include:

- a speculative development
- a loss made on a project
- spending the profit – a yacht, farm or racehorse!

Imagine...a luxurious white motor yacht on a sunlit, azure sea. Intimate anchorages with only the soft breeze sighing across the bay. Making ocean passages in total comfort and safety. Your own captain, chef and crew. Exquisite catering. Fine wines. A complete selection of water toys. Experience the ambience that only good friends can bring. Going where you want to go, when you want. Freedom of choice. An adventure. Risk & Reward.



This is all affordable with the money in the bank. It's a rosy picture so far, so what is wrong with it? Things go wrong, things which cause problems, leading to difficulty for our Surprised Firm. There are two main categories:

- **Financial impacts** are those which act to reduce the level of available funds, such as losses or reduced margins on projects, unexpected organisational expenses, delays in payments from clients or disputes leading to legal and related costs.
- **Timing impacts** are those which relate to the progress of the works, such as delays in progress or completing projects, or delays (failure) in winning new projects.

Each of these causes results in problems due to the inability of the Surprised Firm to liquidate the ‘investments’.

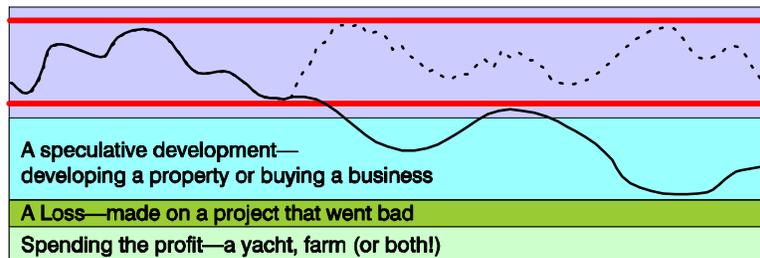


Figure 12: The impact of unfortunate circumstances
Source: Kenley, 2003—Figure 8.6

Whatever the impact, the effect is likely to be slow but inexorable. A downward trend in funds generated from projects will result as expenses are paid out, or as payments committed for work complete must be paid for without corresponding income for new work committed.

Clearly in these circumstances, the contractor needs to make up the shortfall. This can be done in the short-term by borrowing, usually by an overdraft facility. In the longer term, more drastic measures are required. At this point, given the difficulty in liquidating the ‘investments’, it is likely that management would decide that the problem is in fact a short-term effect of a downturn in the market or alternatively an intractable client.

The solution, therefore, would be to take short-term remedial action. Actions which a contractor might take include:

- Buy work—by reducing margins.
- Delay payments (temporarily) from 30 days to 60 or even 90.
- Dispute and make claims, take legal action.

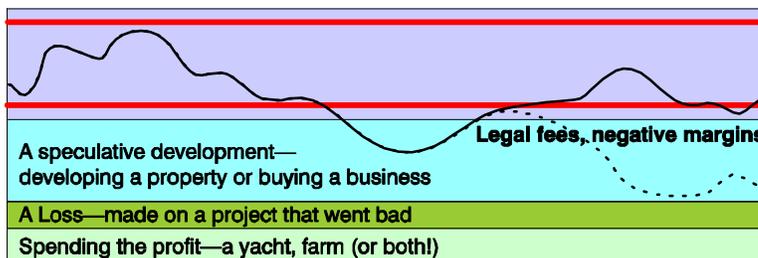


Figure 13: Reversing the trend to stay in business

These actions will have the effect of reversing the trend, by bringing in work and thus cash flow, by deferring payments and thus retaining cash flow, and forcing receipts and delaying payments through dispute. This comes however at a cost. Buying work on reduced margins will lead to a loss of profitability, delaying payments will lead to a loss of support from suppliers and sub-contractors, and disputes with clients will lead to a loss of competitive advantage when pursuing new work.

A contractor experiencing the conditions illustrated above would be able to continue trading but would be finding conditions tough. If they can hold on until completion of the speculative development (assuming it is a property development rather than the purchase of a business) then conditions would ease. Such a contractor would see the sale of the investment as the solution. They might be right, and a profit on the sale would ease matters considerably. A loss on the sale, quite likely in the event of a financial down-turn, would not be quite as effective.

The improved apparent financial position has restored positive cash flow and surplus funds, although the speculative development has been sold at a loss, the yacht is retained and costs of business in the form of reduced or negative margins and legal and dispute costs are gradually increasing (these are cumulative and can never reduce once spent, but rather must be recovered, through future profits).

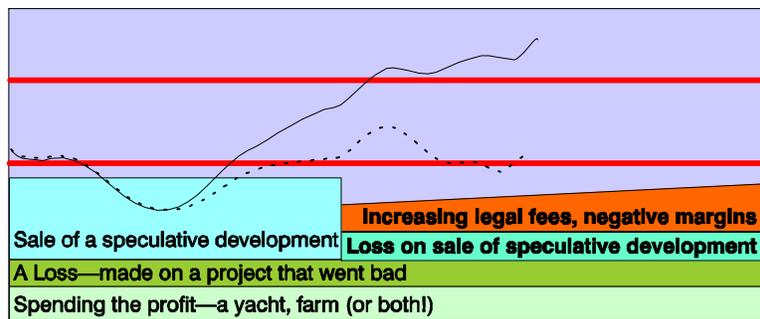


Figure 14: Fire sale – Continuing with increased costs

It is likely, however, that this position is not sustainable. In part the surplus is generated through delaying payments, but these eventually fall due. Incoming projects are becoming harder to win, due to increasing project costs and inflated supplier prices. To make matters worse, reduced quality as part of a cost cutting drive has made clients unwilling to pay and subjected the contractor to claims for defects (Cooke and Jepson, 1979). These problem projects then draw resources away from other projects, causing the effects to mount.

Eventually all these problems compound, usually quite quickly. With insufficient projects entering the system to generate new cash flow, and with committed expenditure eventually flowing out, the end is sudden, seemingly 'unexpected', and very costly to those to whom money is owed. Figure . illustrates the demise of our Surprised Firm. Clearly the responsibility for this disaster does not rest with the client who was reluctant to pay those claims, however, the blame will be laid at the feet of all clients and they may be vilified, as their reluctance to pay will be portrayed as being responsible for destroying an otherwise good business. It will not just be the

contractor who will fail, the effects will also damage or destroy many suppliers and subcontractors.

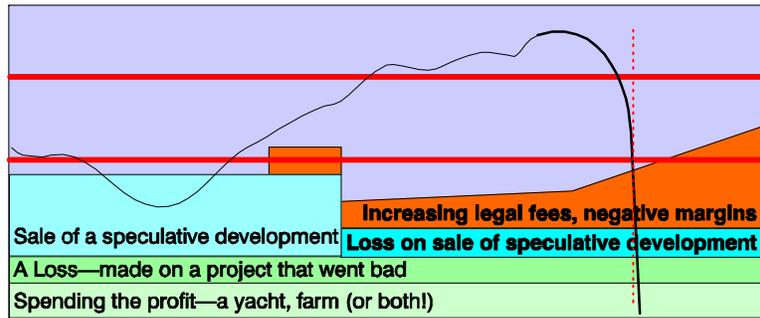


Figure 15: The “sudden” impact of unfortunate circumstances
Source: Kenley, 2003–Figure 8.11

It is necessary to look at the impact of this disaster. If we assume our Surprised Firm is a small-to medium-sized operation with a turnover of say \$200 million, then failure is likely to leave between 10% and 25% of turnover owing to creditors. For our company, this would leave owing between \$20 million and \$50 million. Such a failure would have a significant impact on the downstream companies in the Surprised Firm’s supply chain, as most of this money would be owing to them in what Davis (1991) refers to as the ‘knock-on effect’. The knock-on effect works both up and down the supply chain, causing the insolvency of the dependent subcontractors but potentially also the client, who may be prevented from achieving their goals through the failure of the contractor.

There are several indicators of a construction contractor that is having trouble managing its organisational cash flow and that give clear warning to those doing business with that company. These are indicators only and there may be other reasons for these behaviours which have nothing to do with cash flow. These are not the same as balance sheet indicators of insolvency—such as may be undertaken by a credit rating agency, but rather indicators derived from observation of the behaviour of a company in the market place. Davis argues that many indicators of insolvency: “are matters of common sense but sometimes the same action could be interpreted both as prudent management and a distress signal” (Davis, 1991).

In summary, the indicators may be:

- Unilaterally extending the terms of payment
- Requests for early payment
- Reduced quality of work
- Increased litigation
- Staff turnover
- Apparent success in winning work

The role of planning & control

Bad (and even slow) projects can lead to company failure, due to their impact on the organisational cash flow. The planner is in a unique position to establish a cash flow plan and to drive it for success. However, since the advent of micro-computers in planning, there has been a general dumbing-down of skills and knowledge with regard to detailed planning. It could be argued that software, particularly modern easy to use software, has reduced the need for skill of the operator. As a result, many of the basic skills are not well understood.

To ensure good planning, there is a need to return to good logic diagrams. Accountability can only be held when a schedule is built using competent logic diagrams. Thus planning should be executed in logic diagrams rather than Gantt charts. Microplanner Xpert is an example of a planning tool that natively plans in logic diagrams including both Arrow and Precedence formats.

Control mechanisms also need to be improved. In this context, this means being able to account for the cost of the schedule by cost-loading the schedule. It is also critical that this be tied to the planned cash flow with accurate monitoring and forecasting. Location-based management provides an excellent basis for this level of detail.

The cost loaded schedule must be tied to the terms of payment, particularly inward from the client. It is preferable to disassociate the inward cash flow from the WIP. However, this can **only** be done if the plan will be executed and maintained.

Failure to deliver the plan could lead to project failure with severe impacts on the organisation.

The organisation should not allow projects to control and report their own schedules. There is a high degree of need for centralised planning, monitoring and control.

References

Cooke, B. and Jepson, W. B. (1979). *Cost and Financial Control for Construction Firms*. London, Macmillan.

Davis, R. (1991). *Construction insolvency*. London, Chancery Law Publishing.

Gyles, R. V. (1992). Royal Commission into Productivity, Report of the Hearings. Part 1. Sydney, State Government of New South Wales.

Kenley, R. (2003). *Financing construction: Cash flows and cash farming*. Spon Press.

Kenley, R. and Wilson, O.D., (1989). 'A Construction Project Cash Flow model—an Idiographic Approach'. *Construction Management and Economics* 4: 213–232.