

# Understanding the Dynamics of ‘Abnormal’ Small Firm Growth\*

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## ***Abstract***

Published work in the small business growth addresses many aspects – commending growth objectives, developing and implementing growth plans, and characterising *normal* growth trajectories. However, case study analysis has identified two forms of *abnormal* growth – business “dwarfism” and “gigantism” - which can lead to missed opportunities for owner/entrepreneurs and local economies, and even to business crisis and collapse. This paper describes the analysis of structures that can lead to these phenomena and the capturing of them in qualitative and dynamic simulation models. The resulting models offer practical tools to support small and *micro* firm stakeholders in developing balanced and sustainable growth strategies.

## **Introduction – “Abnormal” Growth Trajectories in Small Firms**

Growth strategies for small and *micro* enterprises is, understandably, a hot issue for academic research and an important focus for small firm support agencies, specialist consultants and advisers, and the owner/entrepreneurs themselves. The reasons for this attraction are not hard to define, as growing firms offer:

- enhanced opportunities for the owner-entrepreneurs, or family owners, to maximise the financial benefits from their efforts and ingenuity; and
- expanding opportunities for employment and trickle down business for the local and regional communities and economies that accompany the progress of the individual firms.

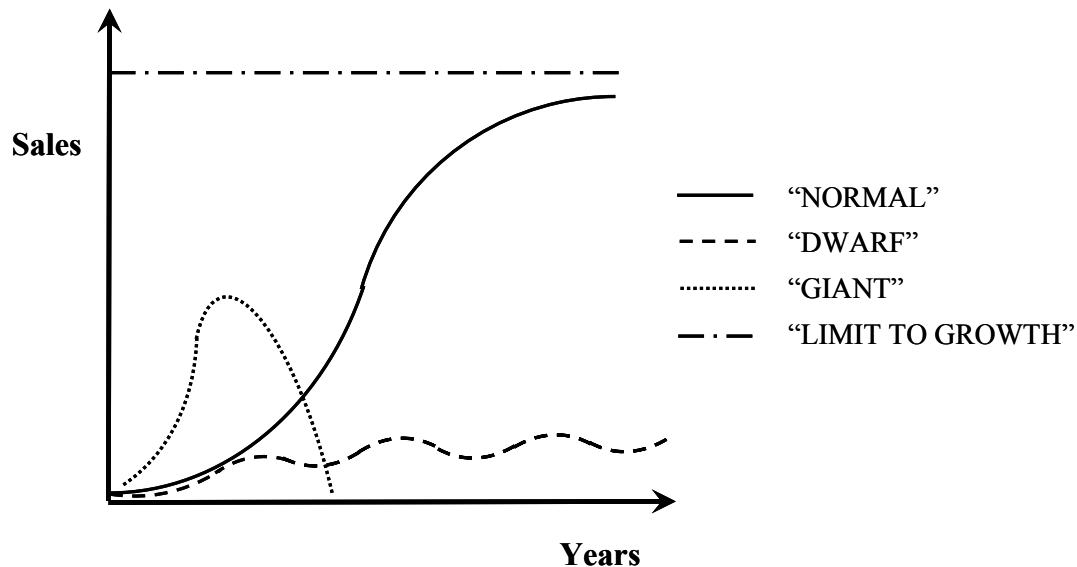
The small business literature concerns many aspects of growth – commending growth objectives, developing and implementing growth plans, identifying the challenges growth brings – and there are a number of growth archetypes. These usually revolve around some form of *normal* growth trajectory involving start-up, early establishment, a growth phase and finally business maturity (see, for example, Churchill & Lewis, 1983; Scott & Bruce, 1987). Of course, what constitutes ‘normal’ is open to debate, but it might be interpreted as an ideal, hoped-for, or even theoretical growth pattern. The classic growth curve is “S” shaped, with the firm’s size flattening to a sustained plateau. This plateau results from there being some form of externally imposed limit to growth – this might be the maximum market share achievable, total market for a niche product, etc. (Penrose, 1995; Barth, 1999).

However, case study analysis has identified two forms of *abnormal* growth trajectories – what might be called “business dwarfism” and “business gigantism”. In the dwarfism case,

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the firm's growth has plateaued well below the natural, or external, limit to growth, implying that the reason for plateauing early is internally generated. In the case of the 'business giant', early growth has shot ahead of what may be considered as a normal growth rate. Such growth is likely beyond the capabilities of the firm, causing it to over-reach itself, and is thus unsustainable and may well lead to business crisis – so called *overshoot and collapse*.



**Figure 1 Normal and Abnormal Growth Trajectories**

Both behaviours are important because they suggest firms that are either underperforming presently (in terms of sales volumes, revenues, or income), or, with gigantism, may presently be over-performing, but with a major risk of crisis and collapse in the future. In either case, the dual benefits to business owners and to other stakeholders might not be achieved, or might only be partially achieved. This paper aims to cast light on how such behaviours might arise, what the implications are, and to suggest that system analysis and simulation offer a way of educating entrepreneurs and stakeholders to the risks and opportunities, and, potentially, to support them in their search for ambitious but *sustainable* growth strategies.

## **The Nature and Causes of Business Dwarfism and Gigantism**

### ***Dwarfism***

The term *business dwarfism* (in Italian *nanismo aziendale*) has been adopted in recent times in the Italian political and socio-economic debate to label a stereotype of business marginality and entrepreneurial mediocrity, based on a structural disengagement from growth. Such firms may well be 'successful' in the sense that they have survived over many years, maybe multiple generations of family ownership, and have been profitable or have provided the owners with what they consider an adequate quality of life. Such firms may have had significant growth potential but the owners have seemingly been unaware or unconcerned that the firms remain small, or 'stunted'. 'Dwarf' firms are commonly characterised (Russo 1988) as those small and *micro* firms whose structure and management routines have been kept unchanged over several decades in terms of structure, processes, and relational systems. An implicit assumption is that those firms which have not been increasing their size for a long time are affected by a 'structural disease' and support systems and tax incentives have been proposed to remedy this malaise. This may support owners whose firms are stunted

despite their efforts and intensions, but does not address the circumstances of those whose 'disease' is purposefully chosen (Bianchi *et al.*, 2004).

Generally the central focus within much of the literature has been on debating the topic of *stunted* or *capped* growth, or even simply *non-growth*, rather than 'dwarfism' *per se*. Holmes and Zimmer (1994) distinguish *Growth Capped* from *Growth* SMEs. In the former, growth is sought and plans are developed to facilitate it, though growth will only be financed by additional equity inputs by the owners or bank debt. If new equity from outside sources is not an option, such firms experience an internal limit to growth. Conversely, the latter kind of firm is more prone to accept external capital sources to foster growth, which allows them to reach a larger size and promote change. Gibson (2002) asserts that "the notion that firms may have a capped growth objective is evident in many areas". This work believes that there are thus many small firms, where owners take actions that suggest they are concerned with maintaining a stable business and that growing out of this stability is not regarded as a primary objective.

In an empirical study oriented towards understand growth and non-growth motivations for an entrepreneur, Perren (1997) defined a number of relevant factors, such as:

- owner's growth motivation,
- management expertise for growth,
- resource access,

and identified that such firms share a common set of negative motivations towards growth and these effects are particularly significant when the market shows a rising pattern of demand. Similarly, Brown and Kirchoff (1997) have investigated the effects of resource availability on entrepreneurial orientation, and they distinguished two important factors: *perceived environmental munificence* and *resource acquisition self-efficacy*.

Past research has focussed on an empirical analysis of more than ten detailed case-studies showing different profiles of *dwarfism* (Bianchi *et al.*, 2004). Based on this field research, the authors have developed a conceptual model and a simulation model aimed at depicting the crucial factors characterising the phenomenon in a *dynamic resource-based* view (Bianchi & Winch, 2005). We have also tested the model with a number of entrepreneurs in order to verify its usefulness in an education context (Bianchi *et al.*, 2006).

### ***Gigantism***

We view "business gigantism" as the emergence of unbalanced and unsustainable rapid growth that is typically stimulated by the 'unnatural' injection of disproportionately very large levels of funding. This might be through over-optimistic plans and compliant, if well-intentioned, funding agencies - often with government grants specifically ear-marked for encouraging small firms and/or regional economic development. This phenomenon naturally juxtaposes the dwarf business situation: firms suffering from business gigantism have grown too big in comparison to their earlier size and state, and have in effect overreached their capabilities. Past research by the authors has also shown that *gigantism* and *dwarf* businesses crises are often interlinked. In common with the dwarfism phenomenon, a lack of understanding about the strategic resource system, delays, and the inertial effects of external factors on the firm underlie the problem (Bianchi & Winch, 2005, 2006, 2008).

The authors have studied two specific cases in depth where small firms secured substantial funding to support new developments. In both cases the funding was via public agencies, and in both cases the funding was secured on the basis of formal business plans which included a need for owners' co-funding. Unfortunately, the static and mechanistic nature of these plans

seems to have concealed the perils facing the firms if they attempt to grow too quickly. Specifically they understated or ignored the need to develop other new strategic resources (e.g. knowledge, prototypes, commercial contacts). In this way, they also seemed to have ignored the need for further equity injections and the time lags in bringing plans to fruition. By contrast, the optimistic views reflected in the plans, which were shared by owners, their consultants, and funders alike, seem to have implied that investing large amounts of money virtually guarantees growth and healthy profits.

## **The Links between Process Structure, System Behaviour and Growth Performance**

### ***Balancing Critical Strategic Resources***

In order to support the various key actors in better framing the systems which generate *dwarfism* and *gigantism* behaviours, the authors have used the System Dynamics methodology. System dynamics is an approach for mapping system structure, quantifying the relationships to produce a set of equations that capture the real world processes, and using these to simulate possible system behaviours over time. The underlying principle is that if process structure determines system behaviour, and system behaviour determines company performance, then the key to developing sustainable strategies to maximise performance is understanding the relationship between processes and behaviours and managing the leverage points.

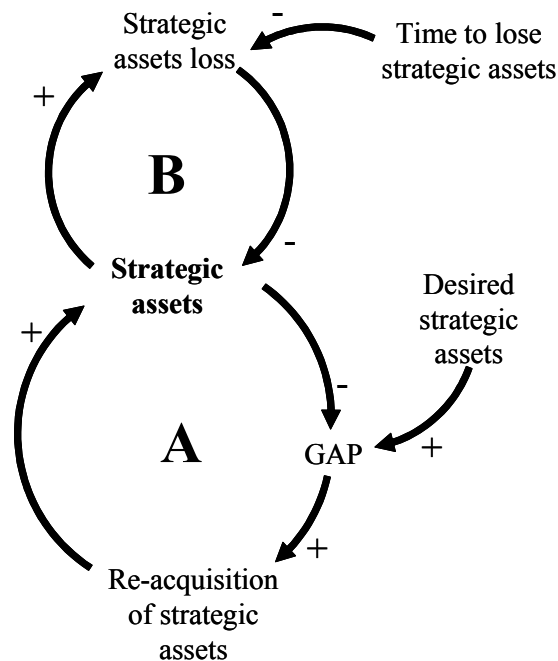
In their original work on dwarf businesses, Bianchi and his co-workers suggested a set of possible business structures based on feedback thinking and structural diagrams reflecting a resource-based view of the firm (see, e.g., Amit & Schoemaker 1993; Dierickx & Cool, 1989; Warren 2002). Our continuing studies of both the *dwarf* and *gigantism* phenomena have confirmed that the management of strategic assets, and more specifically the maintenance of an appropriate balance between the assets, is the key to sustainable growth. (*Strategic assets* is a catch-all term and includes a range of assets or resources critical to the success of a firm.) The emerging models all centre on the building up and decline of key core assets:

- financial assets,
- the quality of products or services,
- customer base, and
- production capacity (e.g. human resources, machinery).

Each of the strategic assets can to some extent be controlled in isolation of the others; however, where there is not *balanced growth* or *coherence* in the assets, then firms will likely be unable to grow to achieve maximum potential, or might grow in a non-sustainable way.

The basic system structure applying in all asset management is as in *Figure 2*. There are two key loops. Loop B reflects that strategic assets are not immortal, and can be lost over time through a variety of processes – plant deteriorates, customers are lost, quality relative to competitors falls. Loop A reflects that firms probably have a target for the strategic asset, hopefully explicit but maybe only tacit, and will take remedial action if the assets fall, or fall significantly, below that target. On its own, loop B would tend to drive assets down to zero, while loop A would attempt to control the assets at or around the target. In a firm for which growth is not a top priority and perhaps where the entrepreneur is really focused on day-to-day operations, then asset management might be overlooked and assets might be expected to fall away over time (Bianchi 2002). This effect could almost be seen as a self-fulfilling mechanism in that accepting the weak asset position is likely to militate against activities that

could lead to growth, and could, if uncorrected, lead to crisis. Such firms are unlikely to have an active programme of replacing lost assets, so the loss could go on for a period of time.



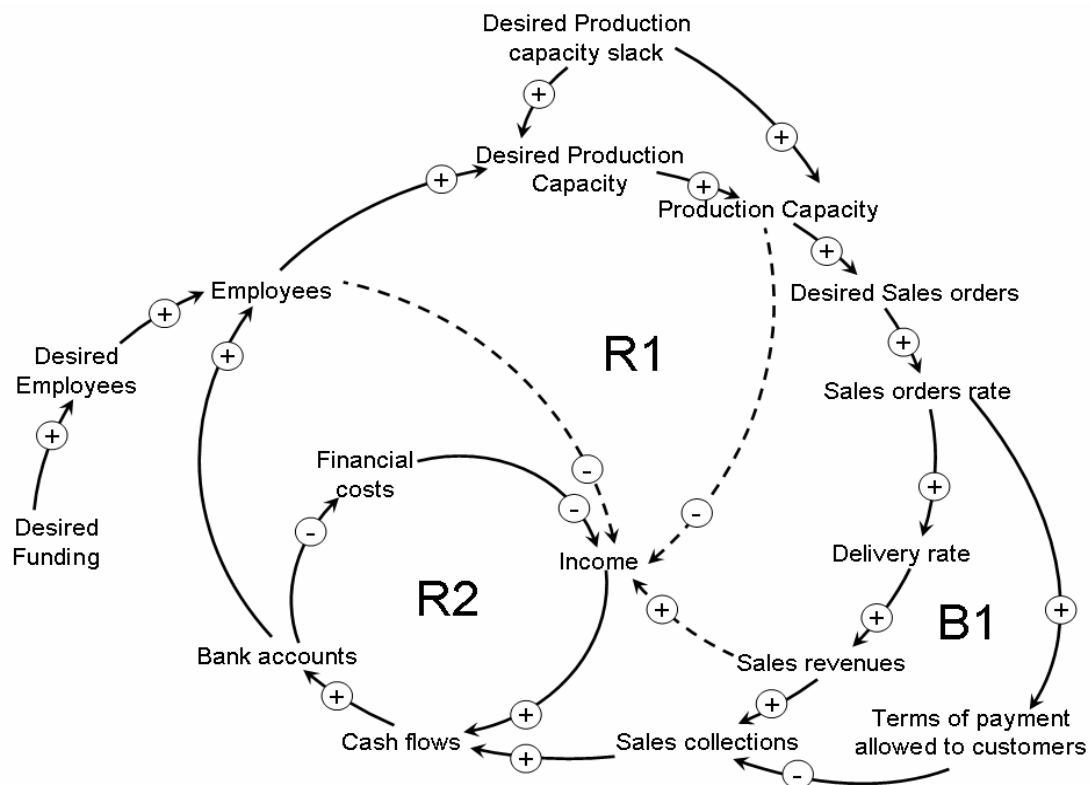
**Figure 2 The Key Structure of Strategic Assets**

Of course, dwarf firms are *not* firms that fail, but ones which survive and possibly operate reasonably profitably over long periods albeit at a small size. It is inevitable therefore that at some point, the dwarf firm owner will recognise that the asset position has deteriorated, perhaps to a point where operations are threatened, and take remedial action. Thus, over time, dominance switches between the two loops, in terms of which is most influential on current behaviour, and an oscillatory pattern of falling and recovering strategic assets will be observed. This pattern suggests that the firm could survive at modest levels of activity but would find breaking out and moving into growth mode would take purposeful changes in operating policies.

Similar issues concerning the dynamics surrounding strategic asset management and asset balance also apply in *gigantism* situations. Our detailed case analysis focused on two such companies which experienced rapid growth stimulated by major injections of development funds. *Figure 3* depicts the main causal structures and three key feedback loops applying in one case – an engineering firm – that can be examined to explain the ‘overgrowth and collapse’ of the company.

The reinforcing loop ‘R1’ shows the intended growth the owners wished to foster when seeking funding. The high funding reflected the objective of hiring a large number of employees and associated increase in production capacity (machinery). Since both the increased staffing and production capacity raised costs and reduced income, the company also aimed to boost turnover by allowing clients more generous credit terms. In this way, higher sales orders were expected to increase sales revenues and liquidity, though these effects would be after delays associated with both the time to complete orders in the industry, and the remarkably generous payment terms. The effect of both delays was, on one hand, to neutralise the reinforcing growth-oriented loop the owners wished to pursue, and, on the other hand, to bolster the balancing loop ‘B1’, which represented a considerable limit to the

firm's operational growth. In fact, it was a major cause of lower sales collections, in spite of a higher order rate.



**Figure 3 – Key loops in a case study firm experiencing 'gigantism' type growth**

Financial crisis ensued as the firm tried to sustain increasing cash outflows to pay salaries and purchases, while it suffered significant problems with inflows due to the long production and sales collection delays. Therefore, rather than increasing bank balances and fostering further growth through capacity acquisition, the firm had to draw down liquidity from its bank credit. This raised financial costs and soon generated losses and negative cash flows reducing bank balances even further.

Common aspects characterising crisis and failure in dwarf businesses have been linked either to a misperception of external factors which may weaken strategic assets, or to an overestimation of the level and consistency in such assets. While the former factor has a major impact on the outflows depleting strategic assets, the latter affects the inflows. Lack of understanding about the strategic resource system, delays, and the inertial effects of critical external factors are common to the two phenomena.

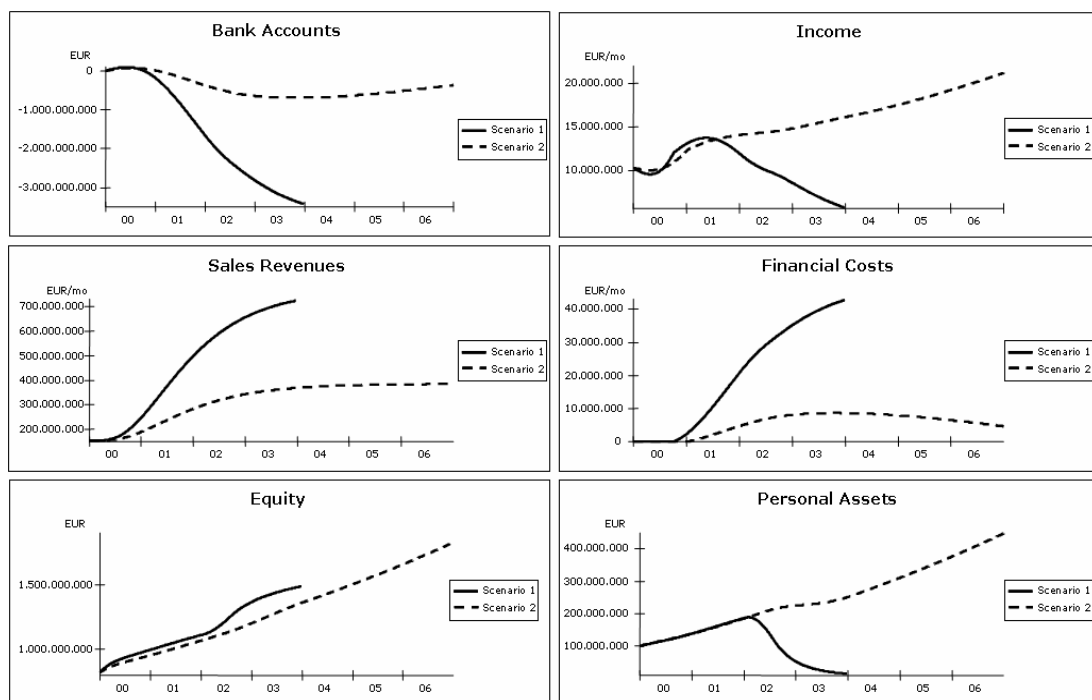
### ***Simulating Dwarf and Gigantism Behaviours***

Typically, analysis with system dynamics is a two stage process. Qualitative analysis, as shown above, can be used to categorise feedback mechanisms, identify key behaviour-determining structures, support the talking and/or thinking through of how behaviour links to structure, and the assessment of possible structural changes. However, in many cases there is a distinct value to complementary quantitative analysis -- simulating system behaviours under different scenarios. In both the dwarfism and gigantism studies, simulations were used to refine the analysis.

Usually, as part of the model validation process, the first stage of quantitative analysis is to show that the model is able to replicate the ‘reference behaviour’ – any characteristic behaviour, such as oscillations, exhibited by the present real-world system. A second phase is likely to involve a variety of runs to confirm how the structure affects behaviour, and from this how changes in the structure might bring about improvements in behaviour and performance (and what changes might actually make things worse!)

Simulations with the dwarfism model give important insights confirming that the application of simple changes in owner-manager attitudes could potentially enable a stunted firm to break out into growth (Bianchi & Winch 2006). However, they also show that there is a real risk of such a firm gradually degenerating into structural instability. The results also suggest that the stable asset situation beneficial for sustained growth requires owners to move to a more reactive attitude to strategic asset management than is perhaps typical in dwarf businesses.

The gigantism simulator was similarly constructed with a set of stock-flow structures, populated with data reflecting an actual ‘gigantic’ company situation (Bianchi & Winch 2008). As an example of the simulation outputs that are achievable, some of the key results are presented and interpreted here (*Figure 4*). In this case study, the policy levers available to decision makers in the simulated firm trying to achieve rapid growth were: (a) desired funding injection, and (b) maximum debt-to-equity ratio.



**Figure 4 Unsustainable and Sustainable Growth Strategies for a Potential “Gigantism” Firm**

The first scenario reflects a very aggressive growth strategy, requiring a high level of new funding, as was the actual case. This financing was needed for the hiring of 80 new employees, to add to the existing staff of barely 20 people; this also required a five-fold increase in plant capacity. In order to justify such funding the firm would have to increase its structure by 400-500% in a very short time! While the time to hire employees was relatively short, around a month, the time to build production capacity was longer - more like 6 months. Despite the timing issues, the new staff were hired before capacity acquisition was decided and started. The second policy parameter - maximum debt-to-equity ratio - is set to 0.65,

implying a strong reliance on the injected funds and a low inclination by the owners to self-fund the growth.

In a second scenario, the desired funding has been set to barely half the first figure, reflecting a more modest objective of hiring 30 new employees with a need to increase plant capacity by about 2½ times. The firm must still more or less double its structure in a short time, though still ambitious this is much less intensive. Furthermore, growth is now more self-funded with maximum debt-to-equity ratio set to 0.4.

As can be seen in *Figure 4*, the first scenario (solid curves) leads to crisis, exactly reflecting the experience of the actual company. On the other hand, in the second scenario (dotted lines) the more modest growth objectives and greater personal commitment by the owners to funding growth reflects a sustainable strategy. Although this leads to lower sales revenues, and also to a lower income rate in the early years, in the long run it shows much better results in terms of both liquidity and profitability and dividends significantly increase owners' personal assets in the long term. The first scenario, by contrast, shows a decreasing pattern in personal assets, owing to a need to invest capital in order to address the debt-to-equity ratio issue.

### **The implications and benefits for both entrepreneurs and other SME stakeholders**

#### *Learning about, understanding and communicating the causes of abnormal behaviours*

This review of linked research projects relating to SME growth has shown that business dwarfism and gigantism are two manifestations of unbalanced growth. Business dwarfism means that a firm has almost certainly underperformed against its potential; gigantism suggests unsustainably rapid growth, causing a firm to over-reach itself, and a longer-term inability to maintain balanced growth might ultimately lead to 'overshoot and collapse'.

In order to encourage small/micro firm owners and other key players to learn from recurrent errors, these two phenomena can be framed through modelling. The process of diagramming is a powerful tool for surfacing ideas, sharing mental models, and talking through consequences. The learning process encouraged by such an approach can be expected to produce a change in decision makers' mindsets, i.e. their mental models. This is not an easy and automatic process, since conservative behaviour and resistance to change are often major barriers discouraging so-called *double loop learning* (Argyris & Schon 1978; Senge 1990).

#### *Reinforcing the link between structural features and unwelcome and welcome behaviours*

A basic analysis of the twin-loop structure in the loop diagram for strategic asset management suggests that while a reinforcing loop can potentially support and feed growth, if the resource is not protected then growth is unlikely to be achieved. In this case, growth plateaus, limited by internal constraints, rather than the firm growing until external, unmanageable constraints determine its ultimate size. If assets are allowed to drain away, with owners only eventually taking remedial action, then there will be an alternating pattern of asset run-down then build-up leading to oscillatory behaviour, as observed in dwarf firms. A characteristic of balancing feedback with inbuilt delays is oscillating behaviour, and simulations with the dwarf business model did replicate such behaviour. The key to turning round stunted firms is therefore the active enhancement of key strategic assets. Basic simulations with the model show this, though more advanced scenarios also show that *balanced* management of interacting assets is necessary to turn the business into a growing business.



With the gigantism phenomenon, the case study companies had adopted highly ambitious growth strategies that actually lead to crisis and failure. The processes most likely to be responsible for this situation had not been identified or had not been analysed fully. The analysis described here has identified processes that could cause unsustainable growth and interlinked them within causal loop diagrams. This includes the loop structures that support growth and those that might kick-in and prevent growth and/or provoke other negative reactions. The simulators reflect the operations of the case study companies, and experimentation has, through the setting policy of levers to critical values, replicated the kind of behaviour that led to major crises in both these firms.

*Supporting the development of sustainable growth strategies.*

The simulations with both models suggest that the application of simple changes in owner-manager attitudes and actions could produce sustainable and acceptable growth – in the case of a stunted firm potentially enabling it to break out into growth, in the case of a possible gigantism scenario suggesting more modest ambitions which could deliver strong and satisfying growth without the risk of crisis.

The results also suggest that the kind of asset stability beneficial for sustained growth would require a more active attitude to strategic asset management than is perhaps typical. The simulator, by demonstrating that growth objectives might be feasible, should stimulate and encourage stakeholders to take a more detailed look at the practical options in individual firms. That said, it took careful analysis and multiple runs with the simulators to find the effective policy balances, and this suggests that the task in real life is indeed likely to be far from easy. However, this work has also shown that the analysis, simulated experiences, and entrepreneurial learning are possible with such simulators, and points to them offering a realistic support tool for this tricky task. Further, the models can be presented in the form of Interactive Learning Environments (ILE), also known as ‘management flight simulators’. Easy-to-use interfaces enable non-experts to rapidly generate and explore a wide range of scenarios allowing direct use by owners to help them understand the dynamic risks and opportunities in changing strategic direction.

Institutional bodies would seem to have a clear commitment to supporting the small firm sector, reflecting the perceived importance of SMEs to employment and wealth creation and the accompanying need to encourage start-ups and business development in the sector. However, it is recognised that in many instances SME development needs will not or cannot be met by the private sector, in part or in full, and this justifies public intervention. The task of using any public monies to maximum effect is a difficult one, and Freel (1998) has argued that the notion of “picking winners” for grant and other support is “not a viable alternative to blanket cover”. Almost by definition, these firms are being moved into what might be considered an ‘unnatural state’ and the task of funding bodies and advisers is thus to ensure that only the firms with most potential are chosen, and then ensure that support is managed so that firms’ full potential is achieved. We argue that a good grasp of the complex inter-relationships between firms’ assets using feedback analysis and simulation should be part of the process of stakeholder interactions in the process of designing sustainable growth strategies that are rewarding, but at the same time prudent and achievable.

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