Fostering Entrepreneurs' Capabilities to Outline Sustainable Strategies in 'Stunted' SMEs through Modelling and Simulation: *a Dynamic Resource-Based View*

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***Name of the Track*: Accumulation and Depletion Systems to Capture Firms' Heterogeneity**

ABSTRACT

The literature recognises the phenomenon of 'dwarf' or 'stunted' small and micro firms (in Italian *nanismo aziendale*) and that they might represent potential lost opportunities for owners and the local economy.

Based on a field survey conducted by Bianchi *et al.* (2003) and the analysis previously developed by the authors of this paper in sketching a simple 'insight' model to simulate the behaviour of such firms (Bianchi & Winch, 2005), this work aims to show further research developments in the effort to better understand the business *dwarfism* phenomenon.

A system dynamics model replicating the basic no-growth, cyclical behaviour attributed to "stunted" SMEs is firstly analysed. Alternative policies arising from different entrepreneur's targets and attitudes towards strategic resources, aimed to change that behaviour to one of stability or steady growth, are then tested and commented.

Although the model encompasses a larger range of inter-relationships than in its early version, it is still a simple insight tool that will be used by the authors in a later step of the research, in

order to conduct field experiments on the way "stunted" business entrepreneurs can better learn and perceive weak signals of crisis or growth opportunities.

In this simple form, the model does link behaviours to system structure and could support individual entrepreneurs in understanding the reasons for dwarfism in their firm and the potential for unleashing growth. It could also further form the basis for a more detailed model to support the identification and evaluation of strategic alternatives in individual firms.

Keywords: Resource-Based View; Strategy Processes; Stunted Growth; Business Dwarfism, System Dynamics

INTRODUCTION

An identified phenomenon in the study of small businesses and entrepreneurship is the 'stunted-growth' enterprise or 'dwarf business' situation. This applies to small companies that cannot be judged as unsuccessful as they have survived for many years and may well have provided their owners with a satisfactory lifestyle, but despite having the potential to grow into larger companies they have remained very small. Some of the reasons for this have been examined in Bianchi *et al.* (2003), and include the level of entrepreneur's inclination to change the business *status quo*, and the consistency of strategic business assets.

Companies that under-perform in this way fail to improve the earnings possibilities for their owners and do not offer the wealth generation and employment opportunities for their local communities. Given the recognised importance of small firms in local economies and the failure rates of new firm start-ups and associated difficulties in developing long-term sustainable businesses, this latter disbenefit is an important loss. This paper builds from the extension of the original work by Bianchi *et al.* (2003) in Bianchi & Winch (2005) by the further development of the simple simulation system dynamics model based on the structures originally identified by the authors.

The feedback model described here are based on structural diagrams capturing the inter-relationships between drivers and decision processes in and surrounding the small firm. These are based directly on causal-loop diagrams - system maps that reflect the circular causality that determines system behaviour. The use of simulation models in this way enables theories about the reasons for business dwarfism to be tested by creating models which replicate the behaviour of actual organisations through the generation of 'reference behaviours' - the characteristic shapes of graphs (timepaths) of key variables over time. Once the possible drivers and decision-making that have lead to dwarfism have been identified, further experiments with the model can investigate possible changes in a stunted business' policies or practices which would offer routes to business growth.

THE NOTION OF 'STUNTED' OR 'DWARF' BUSINESSES

The work that forms the foundation for this extension is reported in Bianchi et al. (2003), which includes a detailed review of the literature on *dwarf* or *stunted* firms. A subset only of that literature which relates most directly to the construction of simulation models of possible mechanisms in stunted firms is reviewed here.

The term *business dwarfism* (in Italian *nanismo aziendale)* has been widely adopted in recent times in the Italian political and socio-economic debate, in order 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 at least have provided the owner entrepreneurs with what they consider an adequate quality of life. Such firms may well have had significant growth potential but the owners have seemingly been unaware or unconcerned that the firms remained small, or 'stunted', and growth potential has not been realised. 'Dwarf' firms are commonly characterised (Russo

1988) as those small and *micro* businesses whose structure and management routines have been kept unchanged over several decades, in terms of: structure (e.g. product portfolio, strategic product positioning, organisation, number of employees, production capacity, geographical markets), processes, and relational systems. An implicit assumption of this perspective is that those smaller firms which have not been increasing their size for a long time – in terms of quantitative indicators – are affected by a 'structural disease' and support systems and tax incentives have been proposed to remedy this malaise. This may support owner-entrepreneurs whose firms are stunted despite their efforts and intensions, but does not address the circumstances of those whose 'disease' is purposefully chosen.

Holmes and Zimmer (1994) distinguish *Growth Capped* from *Growth* SMEs. In the first kind of firms, growth is sought and plans are developed to facilitate it. However, growth will only be financed by additional equity inputs of the existing owners or trading bank debt. Provided that new equity from outside sources is not an option, such firms have internal limits to growth. Conversely, the latter kind of firms is more prone to accept external capital sources to foster growth, which allows them to reach a larger size and foster change. Further 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 *micro* and small firms, where owner-entrepreneurs take actions that indicate they are concerned with maintaining a stable business and that growing out of this stability is not regarded by them as a primary objective.

In an empirical research project oriented towards the understanding of 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,
- demand for products or services.

This author found that non-growth firms shared a common set of negative motivations towards growth amongst their owners, and that these effects are particularly significant when the market shows a rising pattern of demand for the business products. Similarly, Brown and Kirchhoff (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*.

THE ROLE OF MODELLING THE DYNAMICS OF STRATEGIC RESOURCES IN SME TO FOSTER LEARNING AND POLICY FORMULATION

Bianchi et al. (2003) posited a set of possible dwarf business structures based on feedback thinking and structural diagrams reflecting a resource-based view of the firm (see, for example, Amit & Schoemaker 1993; Dierickx & Cool, 1989; Warren 2002). In this paper, we describe the further development of the original quantitative model (Bianchi & Winch, 2005) based around the strategic resource structures identified in Bianchi et al. The model is intended to enable light to be shed on the way that managerial behaviour as captured in the model, including reflections of attitudes and motivations towards growth achievement or otherwise, impact on company performance. Simulated small firm behaviour could make those entrepreneurs unaware of the possibility of these factors stunting growth appreciate this condition, or, in the case of those already aware of missed growth potential opportunities, they could reinforce the specific factors in play. The model could then further be used to investigate alternate, growth-based behaviours that could point to changed and improved decision-making.

This use of this form of modelling to support learning and understanding of SME behaviour and to support entrepreneurs in decision-making and policy formulation is well established by the current authors as discussed below and by others. (See, for example, the Special issue of the System Dynamics Review, on Small Medium Enterprises 2002).

Bianchi and Winch (1999) have reviewed the extent to which such approaches have particular relevance to the SME, and have also considered the specific role of simulators to link strategic thinking with formal business plans (Bianchi & Winch, 1998). Simulators can prove particularly valuable in situations of major change, such as would be the case if a small firm were to break out of their capped or stunted growth mode and to move to a growth mode. Winch and McDonald (1999) and Winch (2000) have reported the potential for such SME simulators in aiding learning and change management in SME situations.

A major issue arises, however, in terms of the level of detail and accuracy necessary in such models, particularly given that the construction of detailed models closely reflecting any actual firm is an expensive process, typically outwith the cost scope of the smaller enterprise. That said, the notion of using very simple models for first analysis even in high-cost consulting applications is already recognised and the term 'insight model' has been applied (Lyneis 2001). Further, it is argued (Arthur & Winch 1999) that if the real test of a model's validity is based on its 'usefulness' to users – how effective they found it in improving their understanding and stimulating their thinking – rather than on how closely it mimicked reality of historic time series, then relatively simple models might be 'valid'; and just as effective as highly detailed models. If simple models can be useful, and particularly if they could be tailored to an individual firm by a simple and inexpensive process, then simulators could be provided to individual firms to support their particular change management issues, and the role of user-paramerised generic models has been investigated to serve this end (Winch & Arthur 2002).

STRUCTURAL BASIS FOR THE SIMULATION MODEL

The major structure that leads to stunted growth identified by Bianchi and his co-workers concerns the accumulation of a company's strategic assets, and specifically the balance

between processes that run such assets down and those that build them up (Bianchi *et al.* 2003). (This basic structure was originally identified by Forrester (1961) as a key to organisation success. in his early seminal introduction to system dynamics) The term *strategic assets* is a catch-all terms and includes a range of different assets or resources critical to the success of a firm – financial assets, customer base, knowledge, product range, product and/or service quality.

Bianchi emphasises the inter-relationship between these key forces as in **Figure 1**.

< Figure 1 about here >

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 can deteriorate, customers can be lost, quality relative to competitors falls if they have a better product development programme. Loop A reflects that the firm probably has a target for the strategic assets, hopefully explicit but maybe only loosely in mind, and will take remedial action if the assets fall, or fall significantly, below that target. On its own loop, B will tend to drive assets down to zero, while loop A will attempt to control the assets at or around the target.

In a firm that is not actively seeking growth and perhaps where the entrepreneur is focused on day-to-day operations, then losses might be expected to fall away over time (Bianchi 2002). This action could almost be seen as a self-fulfilling mechanism in that the weak asset position is likely to militate against any activities that could lead to growth, and could, if uncorrected, lead to a business crisis. Such enterprises most likely do not have a very active programme of replacing lost assets, so the asset loss could go on for a period of time. Of course, dwarf firms are not firms that fail, but ones which survive and possibly operate reasonably profitably over long periods albeit at a very small size. It is inevitable therefore that at some point if the

dwarf firm owner-entrepreneur recognises that the asset position has deteriorated, maybe to a point where normal operations are threatened, then remedial action is likely to have been taken. Thus over a period of 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 that breaking out and moving to growth mode requires purposeful changes in operating policies.

The simulator that has been constructed is designed to reflect a set of critical interacting assets to establish that this kind of oscillatory behaviour can be produced by this double loop structure. The model includes stocks or levels of four important strategic assets – financial assets, the quality of a firm's products or services, production capacity (e.g. in terms of human resources and/or machinery) and the firm's customer base. Each of these assets has an outflow reflecting loss or deterioration of the asset and an inflow reflecting that actions can be taken to build them up. Direct action in terms of product/service R&D and enhancement, more active sales efforts with promotions, recruitment or plant acquisition, and so on are feasible for the latter three assets, but in the first – the financial assets – the in-flow must depend on actions in the other three leading to increased sales revenues and income. In this model it is assumed that the eyes of the owner would mainly be on the financial assets and more specifically on perceived dividends, and it is here that the model assumes targets are set and remedial action is triggered when dividends (based on perceived income) dip to an unacceptable level. The overall structure of the model is summarised in **Figure 2**.

< Figure 2 about here >

The model thus reflects a management process whereby, if it is decided that the dividends (based on perceived income) are unacceptably low, the firm will increase activities to enhance product/service quality, as well as capacity, and will increase its efforts to win new customers to restore assets to the desired level. This will be likely to improve the income rate and hence to dividends.

Further, the link from *Quality* to *Customer Base* also indicates that the model includes a mechanism that makes it easier to win and retain customers if the firm's quality is relatively higher than its competitors.

Likewise, both investments in *Quality* and *Capacity* affect the productivity of commercial efforts (ability to win new customers) through the *strategic assets consistency index*. Such variable tries to reflect the extent to which investments in both sets of strategic assets impacting on commercial policies are balanced enough to sustain stability or steady growth. In other words, if the firm were to try to foster commercial policies by mainly investing in only one of the two above strategic assets, this would result in an unbalanced and unsatisfactory support to its efforts, and therefore could undermine the customer base.

This model also associates costs with the adopted policies aiming to affect the strategic assets endowment over time in order to pursue the desired level of dividends.

The model is populated with figures that are representative of a generic organisation, and are not calibrated to any particular firm. The units for financial resources would be in any appropriate currency units, customer-base in number of customers. Quality, being an intangible asset, is measured as an index where '100%' indicates parity with competitors quality, below suggesting inferior quality and higher suggesting a superior offering. The firm's initial product quality/service is 50%, while competitors' average quality is 100%.

Furthermore, capacity is measured in terms of customers that it is possible to satisfy in a given time through the available human and/or machinery resources. It is assumed that for

each customer there is, on average, a given product demand, and that the average unit demand gradually decreases if the customer base increases.

The decision processes are set up in the model to reflect what is believed about managers in such firms. If the perceived dividends are above or close to their target, then they will be pretty relaxed and will make no great efforts to match competitors' quality advances or replace lost customers. As the situation deteriorates though they will become progressively more concerned and increase their actions to recover. The final model is shown in **Figure 3** ***a-b***.

The diagram, which is based precisely on the formulations in the model, reflects the stock-flow structure inherent in system dynamics analysis and closely allied to the resource-based view of the firm. Thus, the four key assets are reflected as stocks or levels, each with an inflow and outflow represented by pipes with the rates of flow controlled by valves. The stock-flow structures are connected with each other by information links, auxiliary variables and decision processes.

< Figure 3-a about here >

< Figure 3-b about here >

SIMULATIONS WITH THE MODEL

Base or Reference Behaviour

A starting point for most system dynamics studies is the identification of a 'reference behaviour', a single variable or set of time series patterns that characterise a system's basic behaviour. In their original analysis, Bianchi *et al.* (2003) identified four different forms of

dwarf business: *Bonsai, Rickety, Conservative, and Marginal*. They characterised the four types in these terms:

- *Bonsai* characterises those "dwarf" firms within which there is an entrepreneurial spirit that is opened to possible future changes in the business *status quo* – which could be kept silent even for a long time, because of a stable relevant context. These firms also show a harmonious profile, implying a balanced and homogeneous setting of different subsystems suggesting that change could be achievable.
- *Rickety* firms, on the other hand, reflect the situation where the entrepreneur's inclination to change the business *status quo* to foster the undertaking of new growth paths is not supported by a consistent set of strategic assets, neither in terms of their level and mix.
- *Conservative* firms do not display an inclination to change, and are likely to keep a relatively stable and consolidated equilibrium condition in their current strategic assets' profile.
- *Marginal* firms are usually in the market because of their ability to exploit contingent favourable conditions, for example, associated with public financial aids, lack of competition in very tight market niches, or a very loyal customer base. In terms of changing environmental conditions, one would expect such firms to be in a particularly weak position.

However, for all four groups, they suggest a common reference behaviour - a no-growth situation with fluctuations around and just below what might be considered their target for strategic assets. They presented this summary in graphical form, a simplified version of which appears here as Figure 4.

< Figure 4 about here >

The model described above, and parameterised with reasonable values was simulated over a longish period of time, 600 months (50 years). This time was chosen simply to reflect that dwarf firms do survive for extended period of time, and it was also considered long enough to permit oscillatory behaviour to be easily identified.

A base run of the originally sketched model (Bianchi & Winch 2005) appears here as **Figure 5**. The original model did not include capacity and the strategic assets consistency index. It also did not embody the costs related to policies aimed at affecting strategic assets' dynamics. Other important factors which have been included in the new version of the model, whose scenarios will be commented in the next section of the paper, were: *a)* perceived dividend, as a function of income; *b)* desired annual growth rate (in terms of dividends); *c)* equity.

The original model assumed a 40 years time horizon and showed an oscillatory behaviour of strategic assets around the target level. The periodicity of the cycles (around 5 years) was indicated as a function of the assumed delays and decay rates in the example model, while the amplification was remarked as a function of the attitudes and strength of response by the simulated firm when managing product/service, as well capacity development, and efforts to win and retain customers. Should the functions that represent these latter factors be changed then the amplification changed accordingly; for example a less relaxed reaction to perceived financial resource gap being below the target results in smaller oscillations closer to the target figures as in **Figure 6**.

< Figure 5 about here>

< Figure 6 about here >

As can be seen, the less relaxed response portrayed by the model suggested that the oscillations are destined to die out over time. This might be the case if the operating

environment were perfectly constant over the period; however, perturbations, or changes in the environment are likely to trigger further oscillations.

Possible scenarios for a Stunted Firm to Break out into Growth

The new version of the model (as in fig. 3) was run with a variety of scenarios that reflected different possible futures for a dwarf firm to break out of its stunted growth situation. Six are presented here to indicate the outputs obtained and to consider their implications.

Scenario 1 :

A first scenario shows again how the observed system structurally generates oscillations in the strategic assets values over time, around the initial value (figure 7).

< Table 1 about here >

Such oscillations can be amplified over decades due to a more reactive commercial policy aimed to recover lost customers in a short period of time. On the other hand, a more relaxed commercial policy tends to reduce oscillations. However, also in this case (run 2) oscillations tend to increase in the long run.

Another indicator showing that the policy underlying run 2 can be preferable to the two others is related to the "strategic assets consistency index". This is a synthetic parameter showing the extent to which capacity and product service/quality [1] are uniformly adapted and improved

[1] Such index does not include the customer base, though it is also an important strategic asset, since it is in turn affected by capacity and product service/quality.

over time, as a consequence of the firm's investment policy enhanced by the need to adapt average (perceived) dividends to desired levels.

< Figure 7 about here >

Scenario 2 :

A second scenario shows again an unstable system, characterised by fluctuations in the strategic assets values, generated by the entrepreneur's policies.

< Table 2 about here >

However, as shown by the first run, such fluctuations are substantially reduced if the adopted policy is focused on a continued update of capacity and a less relaxed response to the loss of customers and product service/quality.

The policy related to the third run cannot be considered as robust, since it generates wider oscillations in the strategic assets endowment of the firm. In fact, it implies that the aggressive push towards an improvement of the business capability in product service/quality is not supported by a consistent endowment of capacity resources (e.g. in terms of people or machinery).

Also the second run shows an inconsistent behaviour in the strategic assets endowment over time. As a matter of fact, a less relaxed policy in upgrading both capacity and product service/quality does not allow the firm to sustain a stable commercial policy.

It is worth remarking that the above dynamics, and related implications in terms of robust policy making, could be different, if another set of hypotheses were to be adopted in the model parameters setting, particularly concerning:

- the policies adopted by decision makers in upgrading both product quality/service and capacity, as well as in customer acquisition, in response to a perceived gap in dividends;
- the effect of product service/quality and capacity on customers acquisition/loss;
- the unit (commercial, capacity and product quality/service) costs related to the acquisition of the above strategic assets.

Such costs in turn affect (together with sales unit contribution margins) the income rate, which determines both equity and perceived dividends over time.

< Figure 8 about here >

Scenario 3 :

A third scenario aims to test the robustness of growth strategies.

< Table 3 about here >

Three different sets of policies related to the desired annual growth rate (in terms of desired increase in dividends) are tested and matched with the setting of parameters related to the first run of the previous scenario.

The results portrayed in figure 9 show that a 65% desired growth rate (run 2), according to the hypotheses embodied in the model, could generate a growth, which is sustainable in the long run.

On the contrary, a more relaxed growth rate would either level off (run 1) or even generate more undesirable oscillations in the endowment of strategic assets.

The simulation also remarks that pursuing a 65% growth rate would imply for the *dwarf* business the need to substantially increase its own strategic assets. This could also mean to pursue a policy of gradual introduction of managers from outside the business owning family.

< Figure 9 about here >

It is also worth observing that, although a 65% annual growth rate may seem significant in absolute terms, it might not be the case in relative terms if matched to the specific reality of a *dwarf* business, aiming to increase its own structure and processes to a wider dimension, which not necessarily will imply the fact of becoming a medium firm.

Scenario 4 :

A fourth scenario tests the 65% growth rate policy, with the two other policies which were previously discarded when discussing simulation 2.

< Table 4 about here >

In particular, the policy related to the run 2 of simulation 3 is compared with two other policies, both implying a 24 months customer base loss reaction time and that after the 300th month (i.e. the 25th year) a 65% growth rate is pursued.

However, the second policy also implies a less relaxed approach in recovering losses in both product service/quality and capacity. Instead, the third policy tests a short reaction time to losses in service/quality and a long time to restore capacity.

Results are more counterintuitive than the previous ones.

As a matter of fact, run 3 shows a more robust growth pattern than the others.

Consequently, although the third run of scenario 2 showed that if a non-growth policy (aimed to keep stable the system) is adopted, a prompt reaction time to restore product service/quality and a smooth time to restore capacity generate wider oscillations, a growth scenario context suggests that such policy is the most robust one.

Nevertheless, the first bottom-left graph illustrating simulation behaviours suggests that such "best" policy implies a lower level of consistency in the adaptation of the strategic assets endowment, if compared to the other two policies. In particular, under this point of view, the policy associated with the first run is still the most preferable.

An implication of this is that the level of risk implied by the policy reflected in run 3 is much higher than the one related to run 1. Such risk is due to the possibility that the firm could find difficulties in increasing the endowment of its own strategic assets according to the time path and priorities which can better support the high growth strategy. In particular for a *dwarf* business wishing to grow this could mean a significant risk, since it will have to face a sharp discontinuity with the past, that could imply unexpected delays due to different kinds of difficulties (e.g. contrasts in the business owning family, lack of image to attract qualified managers and other resources).

The above thoughts could suggest the opportunity of undertaking a more relaxed and cautious policy, such as the one associated with run 2.

< Figure 10 about here >

Scenario 5 :

A fifth scenario tests the three growth rate policies analysed in the previous one, in the light of a new context: an increase of rivals' competitiveness in which product service/quality level is increased from 100% (parity) to 150% (competitive advantage) from the 300th month.

< Table 5 about here >

Results confirm the analysis previously done. In this case, furthermore, the levels of product service/quality and capacity are higher and more stable than in the previous ones. Similar remarks can be referred to the strategic assets consistency index.

A possible explanation of this is that responding to threats arising from competitors' policies can result in a factor stabilising the business system. This can allow a *dwarf* business to either pursue a more balanced strategy aimed to keeping unchanged the *status quo*, or to grow in a non-turbulent manner.

< Figure 11 about here >

Scenario 6 :

A sixth scenario finally shows a pattern of crisis, associated to a policy aimed to disembark from investments, to restore the level of strategic assets.

< Table 6 about here >

Such a policy has been previously applied especially to what we have called *marginal* firms. In this case, if competitors keep their product service/quality stable over time, the firm will be able to remain alive also for a long time, although its own strategic assets behaviour shows a declining process.

On the other hand, if – after the 300th month – competitors were to increase their level of quality/service to customers, in this case the firm would show a much sharper declining path in its strategic assets, leading to sudden crisis.

It is worth remarking that in this case the only strategic asset showing a relatively stable pattern is capacity, despite the off-loading policy adopted by the firm. The reason for this is that a prompt capacity loss reaction time is adopted, leading to a weak capacity acquisition, aimed to overcome the sharp reduction of dividends caused by unsatisfactory competitive and financial results.

< Figure 12 about here >

The simulations described and discussed above confirm that the application of simple changes in owner-manager attitudes could potentially enable a stunted firm to break out into growth, but also to gradually generate structural instability or even crisis, with the changing set of relevant external variables, such as those related to competitors' strategies, a further factor. They also suggest that the kind of stable asset situation beneficial for sustained growth would require the move to a more reactive attitude to strategic asset management than is perhaps typical in dwarf businesses. Of course, the simulator is only a simple reflection of the selected key assets and it can in no way point to specific actions to achieve quality or capacity improvement and build the customer base. However, by demonstrating that growth objectives might be feasible, it should stimulate and encourage the owner-manager with perhaps other family stakeholders to take a more detailed look at the practical options.

DISCUSSION AND CONCLUSIONS

The literature has identified the dwarf or stunted growth firm, or *nanismo aziendale*, as a significant phenomenon in the small-medium enterprise field. Firms in such circumstances might be failing to maximise the income and wealth creation potential for the owners and mean that the local economy and employment prospects are also constrained. Of course it is also recognised that in many cases the owners are not unhappy with this situation and the firm has provided a satisfactory income and lifestyle, maybe through a number of generations of family ownership. However, as the case-studies in Bianchi et al. (2003) also pointed out, there may be changing environmental conditions or changes in ownership that demand that a firm move into a growth mode.

In practical terms therefore, there are potentially three challenges facing the owners of a dwarf firm:

- Enlightening owner-managers that their firms may be in a stunted growth situation and that there could consequently be opportunities for moving the firms forward. (Though, of course, with the rider that individual owners might not wish to embark on that path).
- Assisting owner managers who might wish to break out in understanding why the constraint has historically occurred, in identifying the possible constraining mechanism(s), and where there is potential to break out by modifying strategic targets and attitudes.
- Identifying and evaluating specific actions and strategic alternatives for achieving growth in the key strategic assets.

The model described in this paper is directed towards the first two of these roles, the last would require a more detailed model calibrated to a specific firm.

Although only a simple model, it does include sufficient detail to enable it to replicate the expected cyclical behaviour of dwarf firms, and to reflect, in a meaningful way to managers, the structures that lead to the ebb and flow of strategic assets and that the firm is constrained from achieving any form of sustained, stable growth. It has also been demonstrated in this paper how it could be used to examine certain changes that might enable a firm to achieve growth in the future. Thus, it is argued, this paper provides the proof-of-concept of using a simulator in the first two roles. However, for the simulator to be fully functional as an insight model, it could benefit from even further refinement, and a development programme could involve the following elements:

- the further enhancement of the model by the addition of further mechanisms to represent the management of other strategic assets that might be relevant for a wider range of firms, for example knowledge-base, company image, or network contacts, and the related analysis of the behavioural impacts;
- the possible refining of the linkages between the assets sub-sectors, including verification of formulations in practitioner forums;

Such a generic model could then be used with owner-managers, maybe in a collective situation like a workshop or small business organisation event, initially to raise the issue of whether they are all achieving the growth potential of their firms and to highlight the constraining factors. A further role for this simulator would be to support the efforts of economic development agencies, small-firm training and advisory organisations, and consultants who support SME development.

Any entrepreneur who might wish to pick up on this and who wants a more detailed model tailored to his/her own firms circumstances could be provided with this option. This could be achieved through two paths. The first would be through the commissioning of the tailoring of this base model into a company-specific model by the addition of mechanism appropriate to

its products/services, distribution channels, target markets, access to incentives and support, and so on, and the parameterisation of the model to its own data. The second, and probably more economical, route could be through the development of a generic model which can be easily parameterised to an individual firm through an easy to use interface. As mentioned earlier, this latter concept has been shown feasible and effective in other research (Winch 2000; Winch and Arthur 2002).

In summary, these results add to understanding of this particular dimension of the growth dynamics of small firms. They could assist policy makers and small firm support agencies in identifying strategies for support initiatives and training that will help small business avoid the pitfalls that lead to dwarfism and achieve their growth potential. The present simulator could also be used to help small companies understand why they might not be as successful as they might and possible changes that could release them from the constraints, or how to avoid falling into this situation in the first place; a more fully developed and tailored simulator to be used to identify and evaluate practical strategic alternates to unleash their growth potential.

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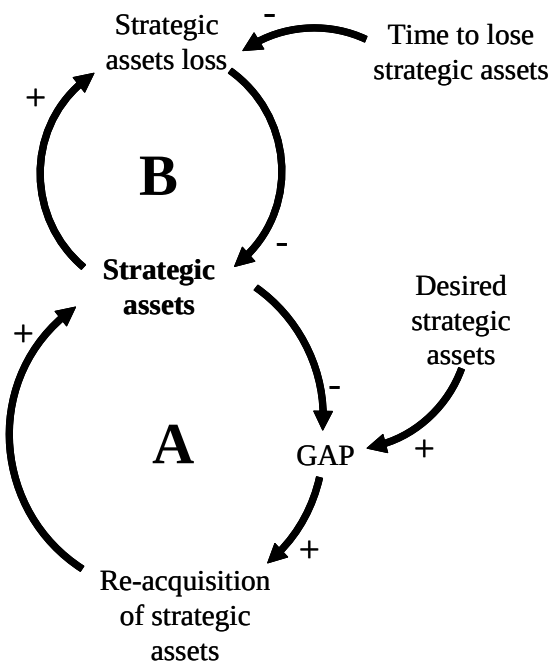

Figure 1 – Key Structure of Strategic Assets

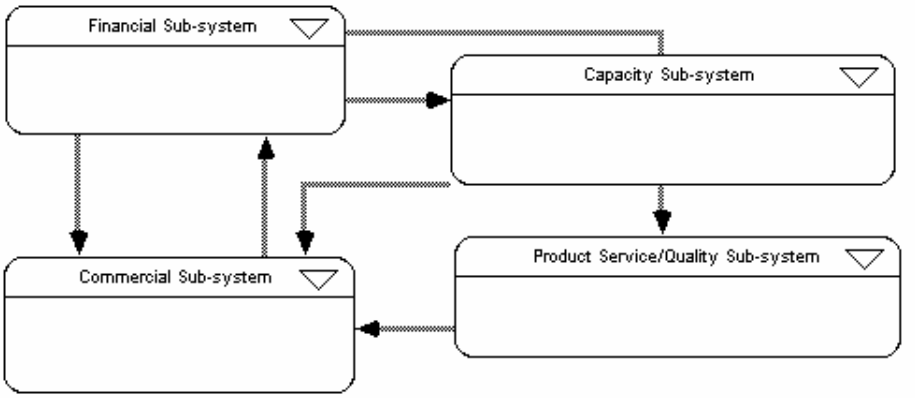

Figure 2 Four interlinking sub-structures for key strategic assets

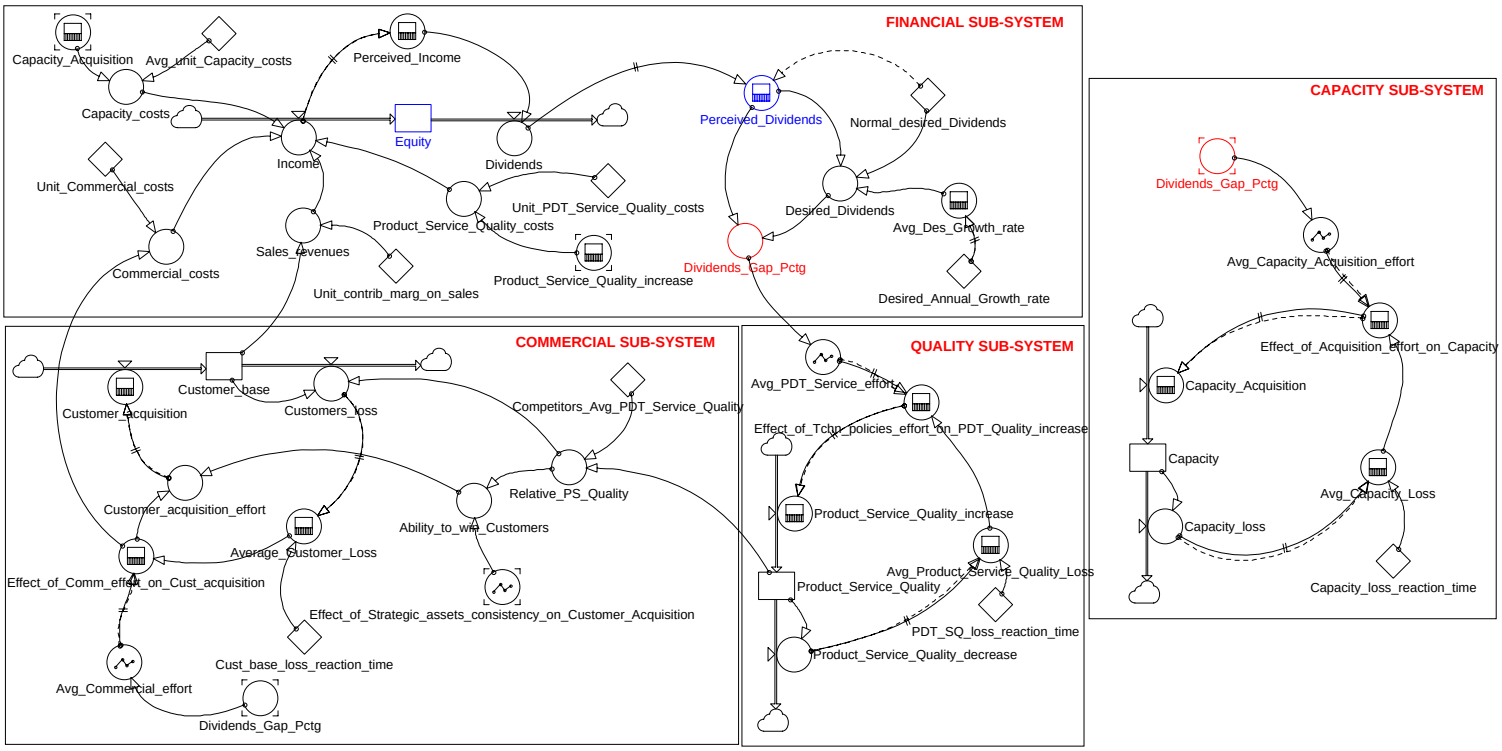

Figure 3-a Dwarf Business Model

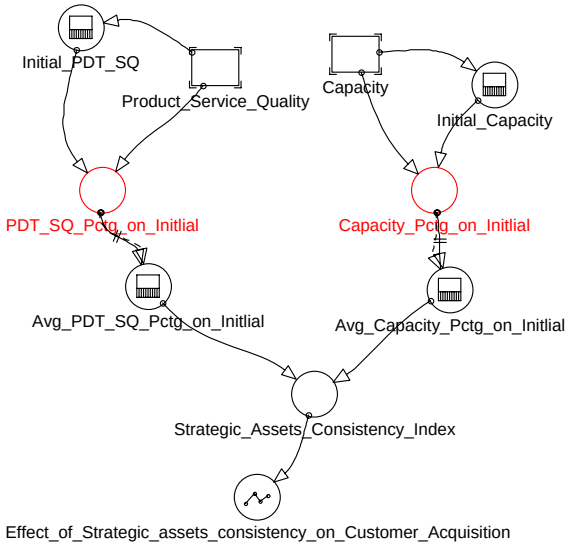

Figure 3-b Strategic assets consistency index

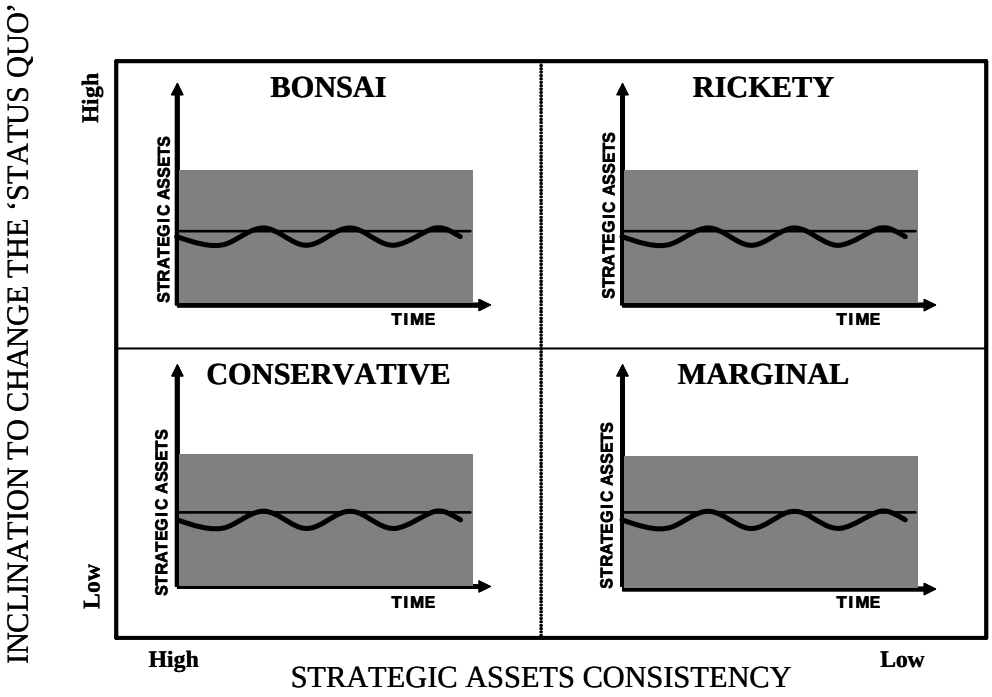

Figure 4 Characterisation of different forms of dwarf or stunted business with common reference Behaviour

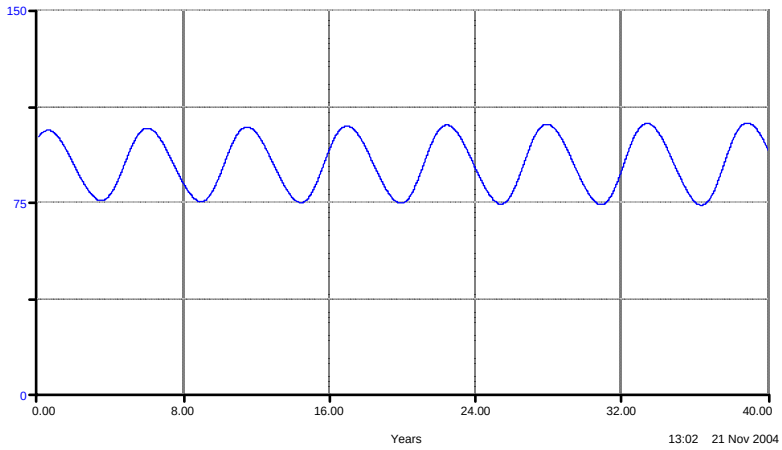

Figure 5 Reference behaviour of dwarf firm with oscillating strategic assets

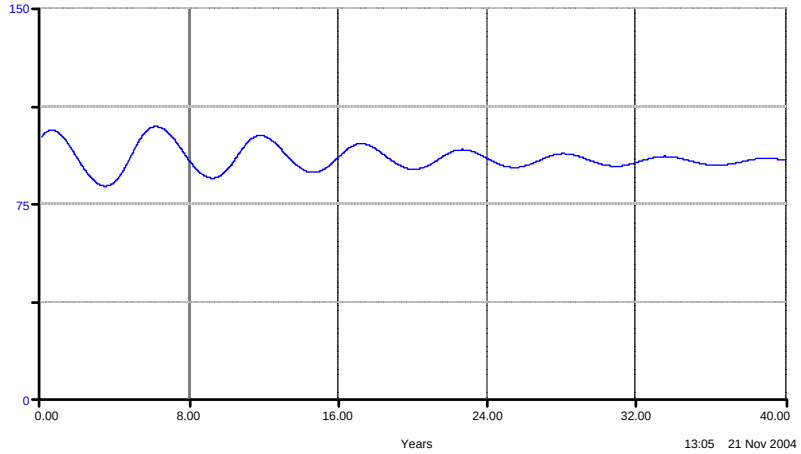

Figure 6 Behaviour of modelled firm with less relaxed responses

PARAMETER	RUN 1	RUN 2	RUN 3
Customer base loss reaction time	12 months	20 months	4 months
Product Service/Quality loss reaction time	1 month	1 month	1 month
Capacity loss reaction time	1 month	1 month	1 month
Desired Annual Growth rate	0%	0%	0%
Competitors' Product Service/Quality	100%	100%	100%

Table 1 Scenario 1

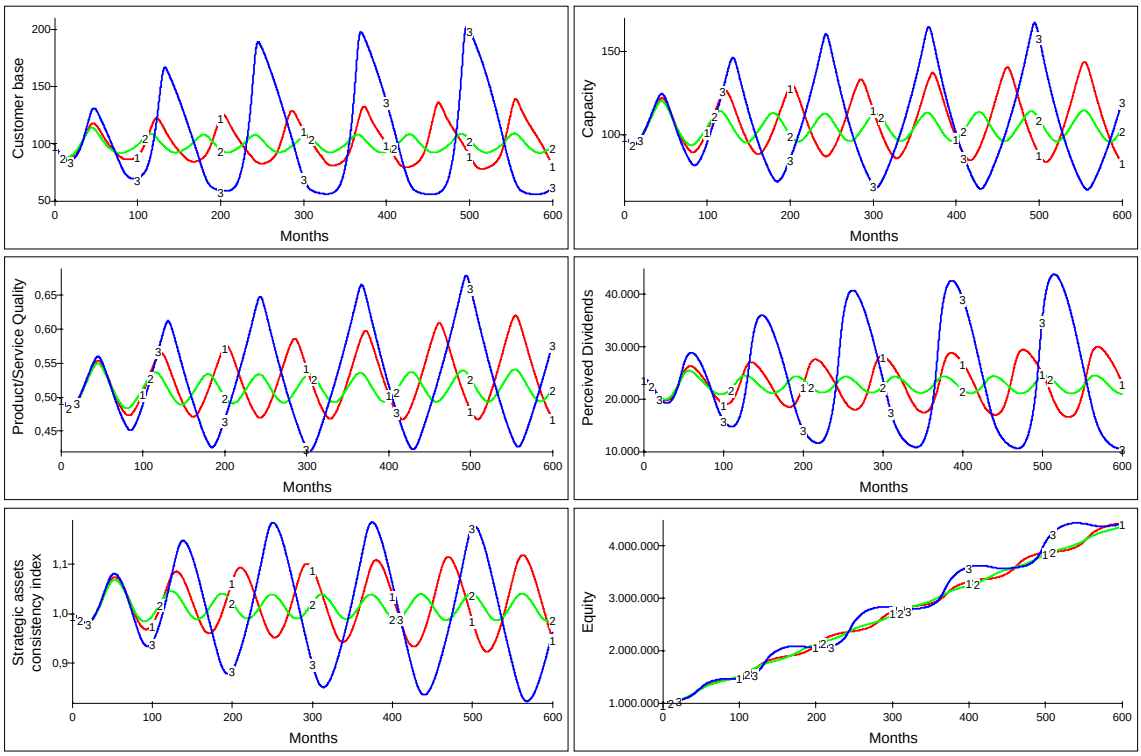

Figure 7 Scenario 1 behaviours

PARAMETER	RUN 1	RUN 2	RUN 3
Customer base loss reaction time	24 months	24 months	24 months
Product Service/Quality loss reaction time	24 months	24 months	1 month
Capacity loss reaction time	1 month	24 months	24 months
Desired Annual Growth rate	0%	0%	0%
Competitors' Product Service/Quality	100%	100%	100%

Table 2 Scenario 2

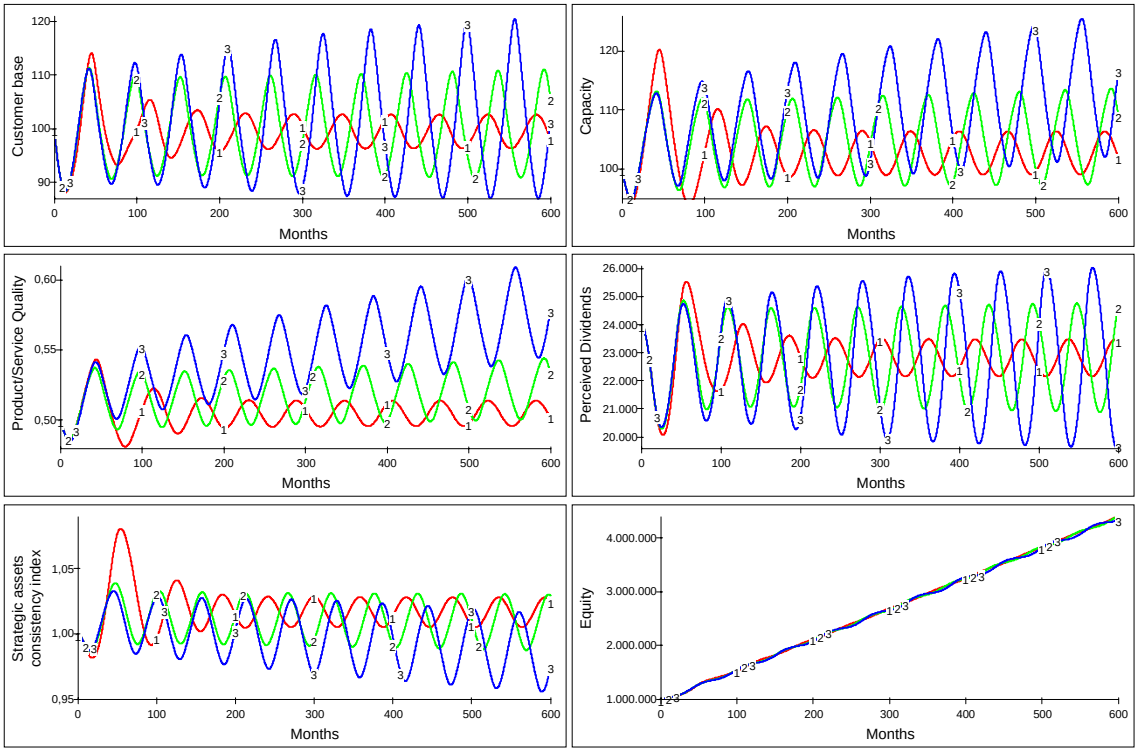

Figure 8 Scenario 2 behaviours

PARAMETER	RUN 1	RUN 2	RUN 3
Customer base loss reaction time	24 months	24 months	24 months
Product Service/Quality loss reaction time	24 months	24 months	24 months
Capacity loss reaction time	1 month	1 month	1 month
Desired Annual Growth rate	60%	65%	55%
Competitors' Product Service/Quality	100%	100%	100%

Table 3 Scenario 3

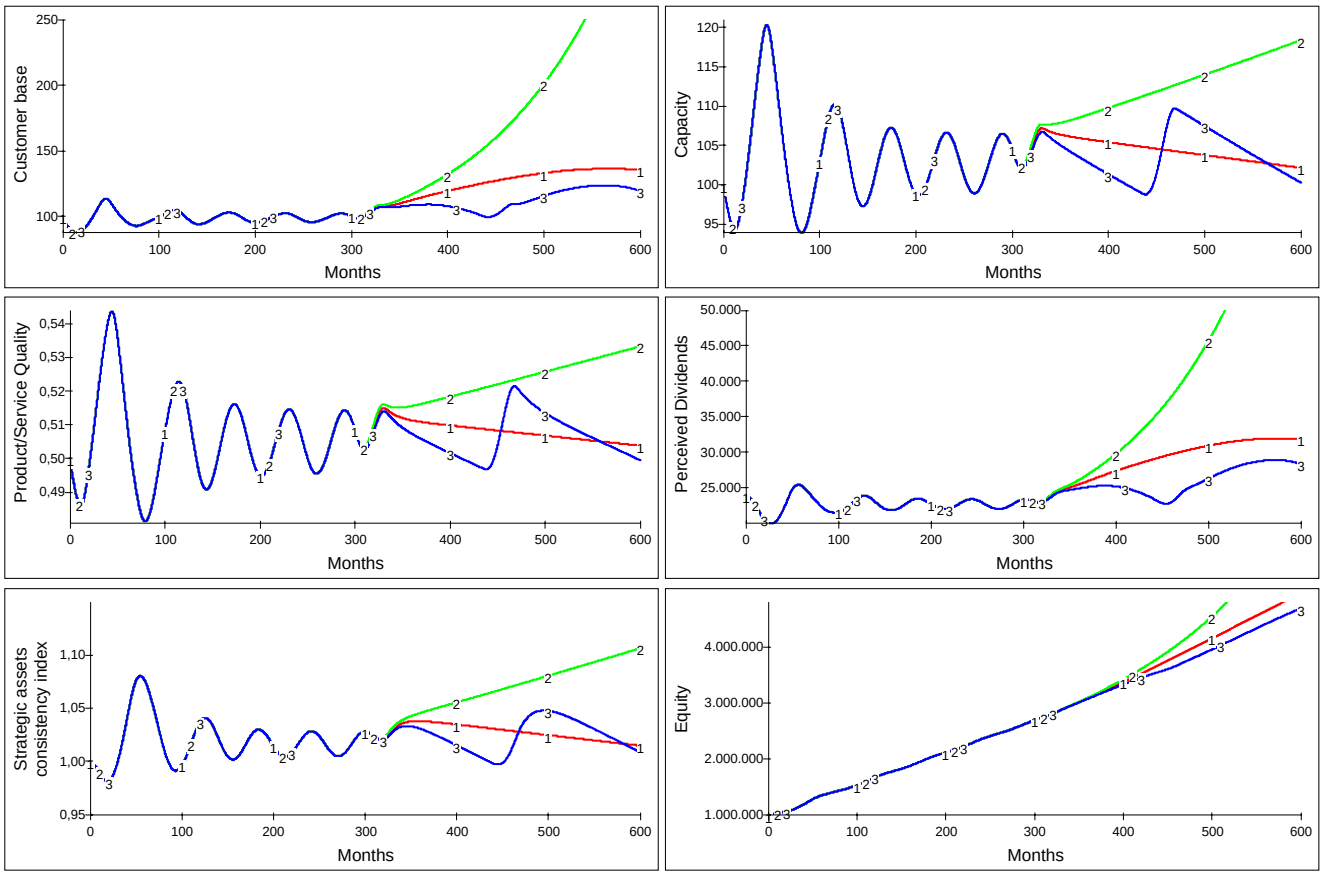

Figure 9 Scenario 3 behaviours

PARAMETER	RUN 1	RUN 2	RUN 3
Customer base loss reaction time	24 months	24 months	24 months
Product Service/Quality loss reaction time	24 months	24 months	1 month
Capacity loss reaction time	1 month	24 months	24 months
Desired Annual Growth rate	65%	65%	65%
Competitors' Product Service/Quality	100%	100%	100%

Table 4 Scenario 4

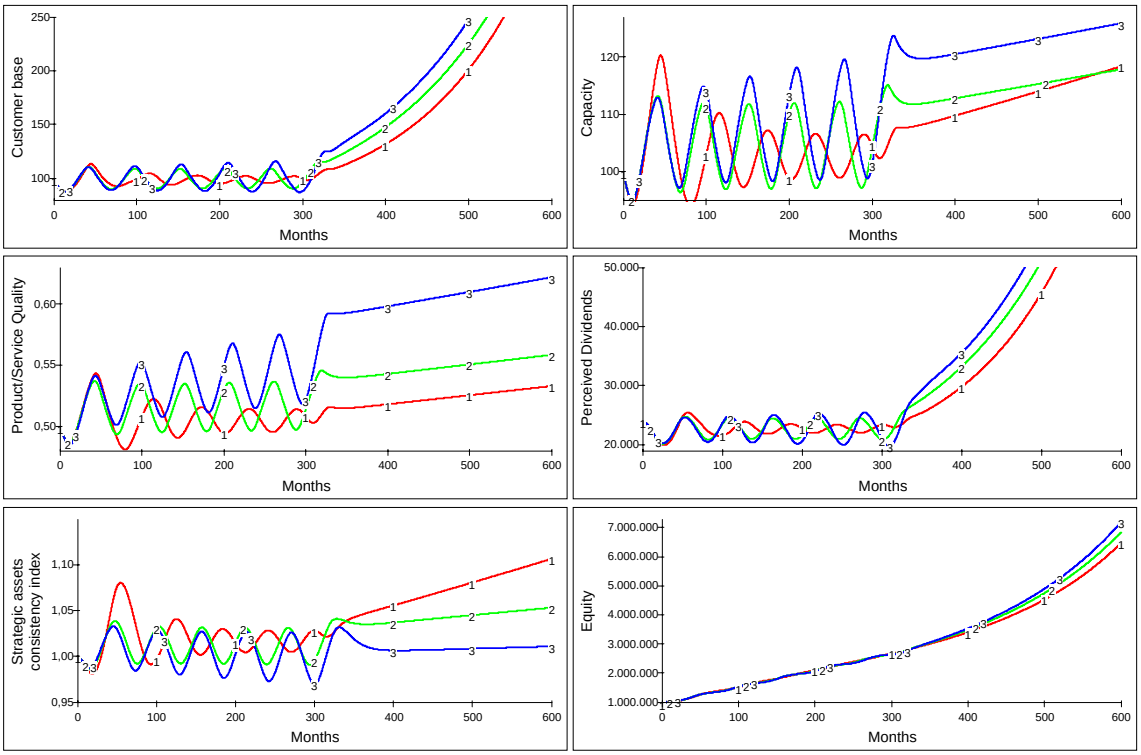

Figure 10 Scenario 4 behaviours

PARAMETER	RUN 1	RUN 2	RUN 3
Customer base loss reaction time	24 months	24 months	24 months
Product Service/Quality loss reaction time	24 months	24 months	1 month
Capacity loss reaction time	1 month	24 months	24 months
Desired Annual Growth rate	65%	65%	65%
Competitors' Product Service/Quality	150%	150%	150%

Table 5 **Scenario** 5

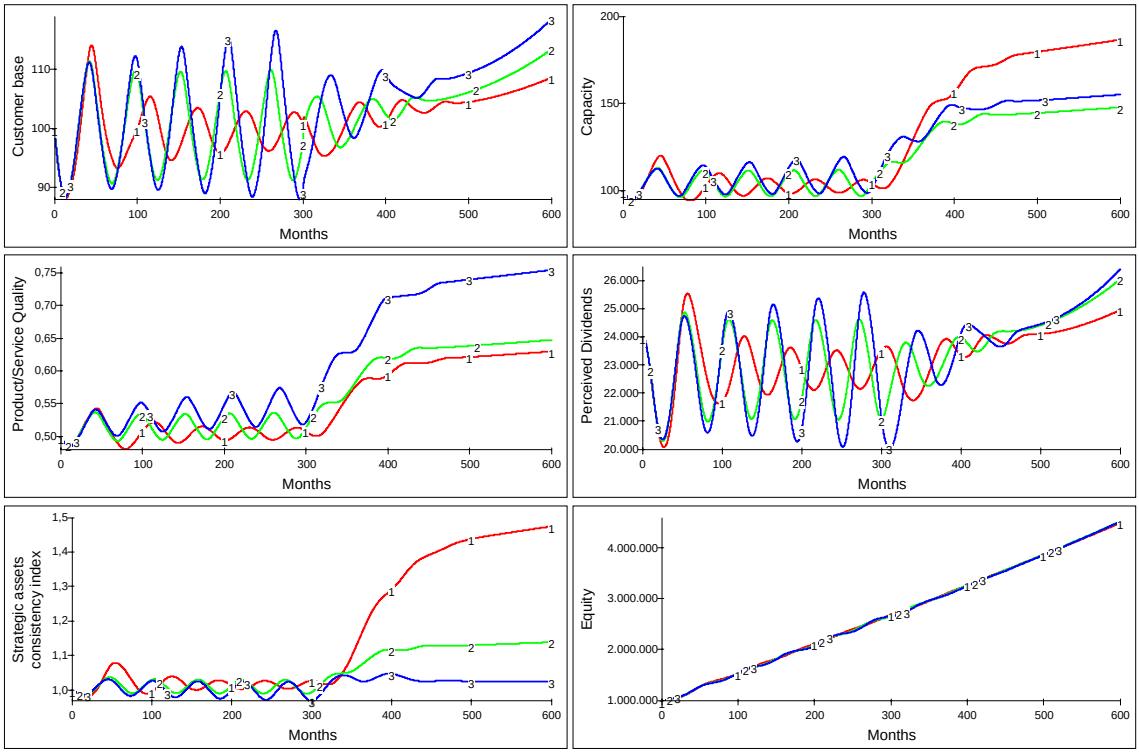

Figure 11 Scenario 5 behaviours

PARAMETER	RUN 1	RUN 2
Customer base loss reaction time	24 months	24 months
Product Service/Quality loss reaction time	24 months	24 months
Capacity loss reaction time	1 month	1 month
Desired Annual Growth rate	0%	0%
Competitors' Product Service/Quality	100%	150%

Table 6 Scenario 6

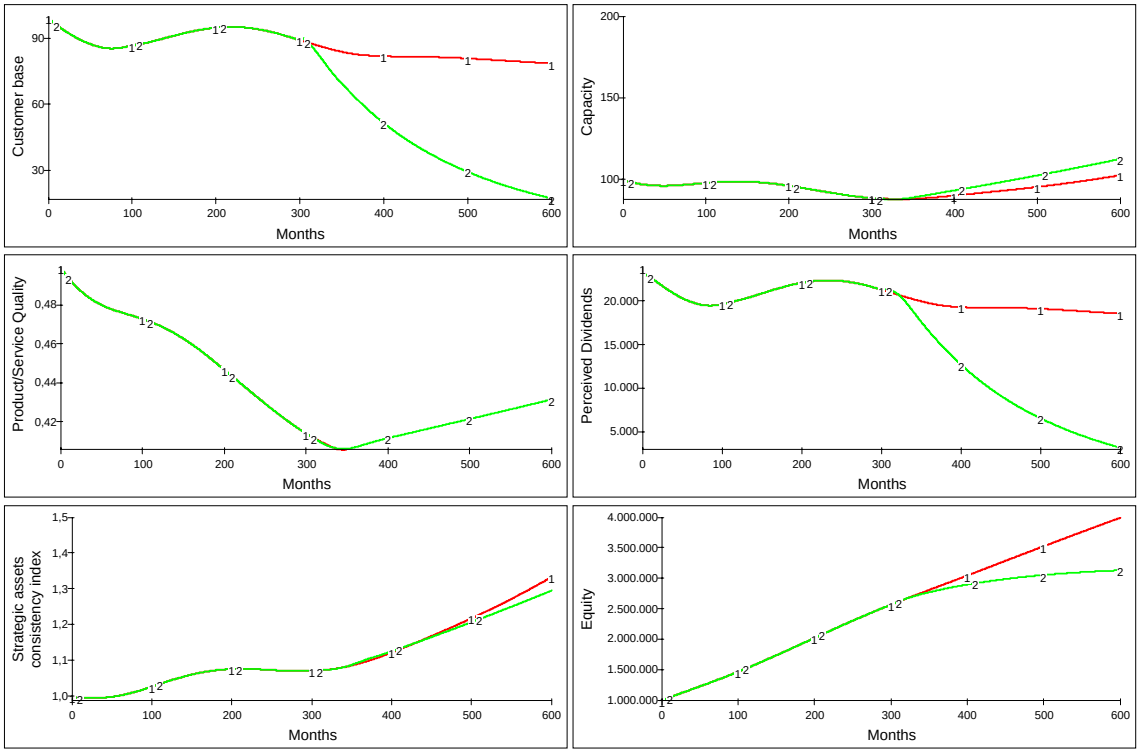

Figure 12 Scenario 6 behaviours