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Fostering Small Business Growth and Entrepreneurial Learning through Accounting and System Dynamics Models

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Abstract

Empirical research on business failure shows how lack of understanding the peculiar context underlying the small business system is often a primary factor of crisis. Particularly when implicit operational growth policies are pursued, high entrepreneurial involvement in current activities and lack of relevant strategic information are major causes of bias and bounded rationality in decision making. As a consequence of this, dynamic inter-relationships between different business sub-systems – on a side – and the firm and other relevant external variables – on another side – are often misperceived. Unintended consequences, such as limits to growth or negative effects produced by escalating and emotional policies, are often experienced and detected on a longer time horizon, when it is too late or expensive to correct the course of action. This paper shows how matching accounting and system dynamics simulation models into computer-based 'microworlds' can support decision makers in understanding small business complexity and unpredictability, thereby improving mental models and awareness of dynamic inter-relationships between short and long term decisions. An example illustrating how a 'microworld' can support policy making in a small firm through the analysis and diagnosis of feedback loops affecting operational growth, liquidity and profitability is provided in the last section of the paper.

1. Introduction

Very often entrepreneurs, either explicitly or implicitly, feel *growth* as a goal to be pursued through their own management decisions. Both operational (e.g. sales revenues) and structural (e.g. net assets) growth are seen as a means to let the business evolve from an early to a more advanced stage. However, growth may also reveal itself as a crisis factor; in fact, a too fast, high or unintended growth rate is often a primary cause of decline in financial and economic company performance. This paper tries to demonstrate how matching system

dynamics with accounting models into computer-based, learning-oriented *microworlds* may support entrepreneurs and other small business 'key-actors' in understanding processes originated by operational growth strategies, in order to foster analysis, diagnosis and policy making.

2. Small firms as a field of research

The subject of small business and entrepreneurship has been much discussed in the management literature. Although an analysis of different concepts of small business goes beyond the scope of this work, it is possible to distinguish two main different points of view according to which small firms have been differentiated from larger ones, i.e. the *quantitative* and *qualitative* perspective. For example, Bolton report (1971) suggests that small firms are those that have: relatively small market shares; a high degree of personalised owner-management; independence in that they do not form part of a larger enterprise and that the owner-managers should be free from outside control in taking their principal decisions. A *qualitative* approach is adopted by those who suggest that quantitative parameters (e.g. employees, sales turnover) do not allow one to define to what extent a firm ought to be considered small or larger (Curran, Burrows, 1989; Goffee, Scase, 1980). Based on a qualitative approach, the concept of small business intended in this paper is that of a *family-owned* firm, where usually the owner-entrepreneur:

- both *co-ordinates* management operations and is involved in *current activities*;
- is not supported by *professional management*;
- involves other members of the equity-owning *family* in business operations;
- is seldom supported by *formal organisation structures* and *planning & control* systems;
- is not prone to *delegate* decision power;
- often makes *intuitive decisions*, particularly concerning on-going operations, based on experience and a "flair for business";

- lacks of *time* available to rationalise strategies, due to his/her emotional involvement in current business management;
- has to balance both *business* and *family* requirements.

In spite of SMEs relevance to economic growth and stability, many entrepreneurs often seem not to be well supported by the wide range of business actors (e.g., banks, professional accountants and other external advisors, University researchers, etc.) with whom they currently interact. This phenomenon could be explained by a number of factors, such as lack of information, business culture and time available due to entrepreneurs' high involvement in current activities. Regardless the causes, a recurring circumstance is entrepreneurs' loneliness in facing difficulties hidden by small business growth (Gumpert, Boyd, 1985), which is very often a primary cause of failure.

3. Main factors of failure related to small business growth: the need of a holistic and learning-oriented approach

The scientific debate on the causes of small business failure has been fruitful, particularly in the last decade. *Financial problems* (e.g., undercapitalization, cash flow management, ability to control costs) have been indicated by some scholars (Festervand, Forrest, 1991) as the first cause of small business failure. Although financial analysis and net working capital management is considered as a very important issue by small business entrepreneurs, a significant percentage of firms do not use any of these concepts (Nix, McFetridge, 1987). A survey (Hutchinson, Ray, 1986) also showed that in a 33 firms experiencing a "supergrowth", 18 suffered for a long period of time from a negative net working capital (Schulze, Dino, 1998; Merikas, Bruton, Vozikis, 1993; Peel, Wilson, 1996).

Management problems have been indicated as the second leading cause of crisis. Entrepreneurial *inexperience* and *incompetence* have been identified by several authors as a primary cause of small business crisis (Ault, Miller, 1985; Olivera, Martin, 1993). Another significant weakness has been indicated in the lack of qualified personnel and ineffective

assignment of rules and tasks to family members and in the ability of entrepreneurs to adjust to the fast paced environment (Bradley, 1997). Conversely, from a survey conducted on a sample of unsuccessful small businesses, it has been remarked that it is not uncommon for entrepreneurs to blame external factors for their failure rather then themselves. (Lussier, Corman, 1995, p.5). In fact, *undercapitalization*, *recession* and *creditor problems* have been indicated by the interviewed entrepreneurs as the major causes for their failure, while *poor management*, *lack of planning*, *recordkeeping* and *financial control* are not adequately taken into account (O'Neil, Duker, 1986). Some other scholars (Moran, 1997; Aitchison, Van Auken, Komacara, 1994; Ward, Aronoff, 1990) have been focusing their research on small business entrepreneurs personal characteristics in order to find some relationships with possible constraints to pursuit of the firm's growth.

However, from the above mentioned literature what does not emerge is another important factor of small business failure, related to low entrepreneurial *awareness of the relevant business system structure*. In fact, quite often the relevant business system does not coincide with the internal boundaries of the firm. It also embodies a wider range of variables belonging to other external sub-systems, related to the competitive, social and equity-owning family environment. Such a misperception often leads small business entrepreneurs to take their decisions according to a bounded point of view, both in terms of time horizon and causal relationships between internal and external relevant variables. Entrepreneurs need not only to acquire managerial concepts, technical capabilities, or qualified professional management; they also, and particularly, need *to learn* (Cressy, 1996). Learning may allow entrepreneurs to understand and manage business complexity, whose characteristics are peculiar in the small firms context.

4. Managing small business growth in complex and unpredictable systems: implications for strategic control

Complexity and unpredictability usually have a specific and different shape in small firms than in bigger ones. Figure 1 depicts three main interrelated complexity factors which often lead to small business failure, i.e.: a) *internal*; b) *external* and *family-related* factors [i]. *Internal factors* are those which are related to variables located inside the firm. Among them, the most influential may concern: entrepreneurial managerial attitudes, "debts/equity" ratio, planning & control methodologies and tools, human resources, innovation management. *External factors* are mainly related to competitors, customers, financial institutions and other actors which interact with the firm from the outside. Perceptions about external factors are a key linking mechanism between internal and external factors. Lack of understanding industry "rules of the game" and difficulty to provide financial or human resources to sustain growth are among main external factors of small business failure. *Family-related factors* refer to the overlap (Landsberg, 1983) between the firm and equity-owning family. Such overlap often leads to two problems: 1) bias in profit and cash flows expectations leading to uncontrolled liquidity withdrawals from company bank accounts to satisfy family needs; 2) uncertainty in the definition of roles played by family members into the firm.

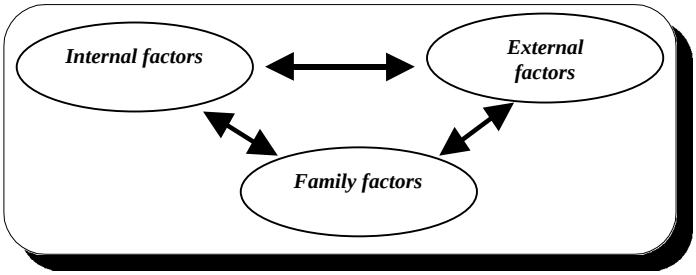

Figure 1 - Three categories of the causes of small business failure.

Owing to their particular tendency to be subject to environmental unpredictability, much more than bigger firms, in small businesses the *boundary between 'short' and 'long' term* is usually particularly soft. Small business entrepreneurs are almost always completely involved in current activities for three main reasons: 1) usually they are not prone to delegate; 2) they usually do not dispose of any prompt and selective information support which allows them to anticipate future events; and, 3) the weak relative weight of the firm in the relevant environment often forces them to adopt a reactive and emotional decision making. Managing

small firms is often a matter of a continuous striving aimed at escaping from unexpected external or internal events. It is a kind of *muddling through* (Limbloom, 1959) which very often does not allow a formal or conscious definition and planning of strategies to be pursued. From these considerations the conclusion does not emerge, however, that small firms do not have any strategic information need and do not need to plan for their future. On the contrary, particularly in small firms, qualitative and quantitative growth depends on the extent to which the entrepreneur is able to discern relationships between current decisions (or short-term objectives) and long-term wider goals. Being aware of dynamic relationships between current and future events is an important outcome of the *learning process* (Bianchi, Winch, Grey, 1998). In order to understand the strategic impact of current decisions on a longer time horizon, a higher selectivity of business control systems is needed. In fact, current management takes places on an on-going basis, but not all current decisions have the same level of strategic importance. Detecting weak signals of strategic change hidden in current activities implies a level of complexity that is different from longer run decisions related to capital investments. Even though, in the first case, the structure of the system to be managed (relevant variables, connections between them, delays, etc.) can be more easily defined than in the second one, monitoring strategic relevance of current events implies a major difficulty in detecting in advance *weak signals of change* as they are usually hidden in a wider range of daily occurrences in which the entrepreneur is fully involved. Particularly in the last two decades, literature on *strategic control* has been proposing several theories on how to include a 'strategic' view into business control systems. However, poor results have generally been attained in practice. In fact, strategic control has been applied only with reference to some large companies and very often even the most careful and straightforward strategic control system design has not been followed by a real implementation (Goold, Quinn, 1990). This sharp mismatch between theory and practice seems to be caused by the use of a *project* approach in business control systems design (Amigoni, 1979; Brunetti, 1985; Bergamin

Barbato, 1991; Bianchi, 1996). In fact, a sharp distinction between *strategic* and *management* control system is done, based on the following implicit hypotheses:

- it is possible to separate *short* and *long term goals*/planning and implementation (Asch, 1992; Band, Scanlan, 1995)[ii];
- strategic control mechanisms have to support strategic planning in setting clear and precise objectives in order to *reduce complexity*;
- *responsibility units* devoted to strategic planning and control *are different* from those oriented to strategy implementation (Lorange, Chakrawarthy, 1991);
- *tools* supporting strategic planning and control *are different* from those supporting management control.

This approach has produced an increasing bureaucratisation and a lack of communication between the headquarters and planning staff and the operational divisions, even in many large companies characterised by an articulated organisation structure using sophisticated control tools. This situation often led divisional management to depart from policies and goals officially declared in strategic plans (*exposed theory*), in order to make other decisions (*theory-in-use*) (Argyris, 1985) which were seen as more coherent with the characteristics of the systems to be managed. In order to include a strategic perspective into business control systems, particularly when management systems complexity and environmental unpredictability are significant, it is necessary to use a different approach. *Rather than focusing on systems design, it is much more important to affect people's mindset*. This shift from a *project* to a *behavioural* approach in control systems design is not a trivial one. *The project approach implies that people fit into the structure and its focus is on information; the behavioural approach is focused on learning.* According to this perspective, the difference between strategic and management control tends to become more blurred, as the control system (as a whole) is oriented to achieve a common goal: *strategic organisational learning*. In other words, such an approach implies that strategic control may allow people to *deal with*

uncertainty, to better frame systems in which they are involved, in order to understand management complexity and unpredictability. Such a goal may be attained only if strategic management is seen as a *continuous* (rather than *discrete*) process, according to which also current actions may disclose significant strategic outcomes.

Which models and tools can support a small business entrepreneur in managing growth in a *learning-oriented* approach?

5. Accounting and system dynamics models: two complementary perspectives in managing small business growth

Accounting models can be considered as the main source of information in small firms. They mainly draw data from *transaction systems* (e.g. inventory, payroll, accounts receivable/payable) which usually feed the General and Factory Ledger and other tools supporting budget formulation, variance analysis and spreadsheet modelling. The aptitude of basic accounting models and tools to support decision makers in understanding the dynamics of business growth is relatively low, particularly when systems complexity and unpredictability are significant. In fact, although financial accounting is based on a system of records and a coherent body of evaluation principles, a *sectional* and *static perspective* is adopted. Accounting values are originated by records concerning single transactions, and gather a *detailed database* which periodically provides *static* and only *financial* information. In spite of the above drawbacks, accounting models are able to give decision makers a detailed information base to detect the pattern of behaviour of key variables over time, from which relevant strategic issues can be focused. However, both the lack of adequate business control systems and high entrepreneurial involvement in current activities are two major causes of intuitive decision making, mainly based on “flair for business" and often opportunistic/imitative behaviour in many small firms.

When small business entrepreneurs perceive a “strategic” information gap, they often follow the same paradigms of bigger companies (Gibb, Scott, 1985. For instance, *spreadsheet*

simulation models, based on periodical balance-sheet data extrapolation, are used to help decision makers to draw up budgets, business plans, and to support financial management. However, very often such an approach is based on a linear, static and narrow perspective, which lacks to consider feedback loops and does not take into account relevant *external* variables, such as competitors' reactions to business policies (Richmond, 1994). Even though spreadsheets may often provide *simple* models, they face the risk to support decisions based on *simplistic* hypotheses. Only apparently simplifying systems analysis allows one to reduce complexity (Shrage, 1991). Complexity and unpredictability ought to be understood and properly handled through modelling: *interdependencies* between variables, *relationships* between policy levers and affected variables, *delays* between causes and effects.

Another accounting tool that is often used to fill small business strategic information gaps is the *factory ledger*, which allows one to calculate costs and revenues related to different processes, products and/or strategic business units. Even though a functioning industrial accounting system may be useful for a small firm, it is not always the most consistent and proper answer to business strategic information requirements. In fact, *industrial*, like *financial* accounting, is based on analytical and hierarchical databases which give rise to detailed reporting that could not properly fit into small firms for three main reasons:

1. it implies that a controller should be in charge of reporting analysis. However, it is difficult to find such an organisational unit in many small firms, owing to the tendency to centralise managerial tasks and to cut fixed costs to reduce economic risks;
2. reporting delivered by a factory ledger is usually related to *responsibility centres* in order to allow managers to support performance evaluation and budgeting procedures. However, small firms often lack of professional management and formal procedures to evaluate performance and to formulate budgets involving different functional units and responsibility centres;

3. the entrepreneur and his direct collaborators usually do not have enough *technical competence* and *time* to analyse a detailed reporting and operate a diagnosis to correct, if necessary, adopted policies.

When the firm operates in a complex and dynamic system, and if mental models are only supported by the accounting system, it is likely that entrepreneurial decisions will be oriented to a conservative approach that will give rise to a *single loop* learning process (Argyris, Schon, 1978). *Single loop* learning implies that organisational routines are not questioned by decision makers for a relatively long period of time, and change mainly occurs through discrete events. According to such a view, strategic management is only seen as a matter of long term decision making and a sharp distinction is made between strategic *design* and *implementation* (figure 2). The perils of *single loop* learning concern the possibility that current decisions and actions are taken according to a defined strategy which ceases to be consistent with the modified set of relevant system's variables. The higher systems complexity and unpredictability is, the bigger is such a risk. In order to overcome such weaknesses, it is necessary to enhance *double loop* (Sterman, 1994) learning, which allows decision makers to evaluate consistencies in their "*mindset*", i.e. the way they frame problems and strategic issues. Double loop learning can be fostered by the *system dynamics* (SD) methodology, because this approach specifically allows decision makers to make their mental models explicit, to assess their consistency and to improve them. A *dynamic simulation model* (Forrester, 1961; 1968) is based on *explicit statements of policies* underlying the decision making process, according to conditions (information on *levels*, time delays and external input constraints) arising within the system. In accordance with the systems feedback view, decision making is seen as a *continuous process of converting information into signals* which feed *actions* oriented to change *levels.* Such a conversion process is not always clear and explicit in organisations and may concern different decision makers. The development of an SD model is a highly interactive process involving decision makers and other external

actors, such as the modeller/*learning-facilitator*, sometimes also supported by professional accountants. The process is co-ordinated by the modeller, who has to practice not only technical abilities, but also *maieutics* [iii]. In fact, modeller has to articulate and, then, to foster the sharing process of the participants' views through the following steps (Winch, 1993): a) representation of company and business structures and analysis of past key variables' behaviour; b) capturing decision processes; c)specification of key-actors' perceptions and alternative scenarios for the economic and competitive environment; d)model simulation of the firm to reproduce past behaviour and to evaluate future behaviour of the business system, according to a given set of adopted policies; e)linking structure and behaviour of the system (Davidsen, 1996). Making decision processes more explicit (Morecroft, 1994; Vennix, 1996) through dynamic modelling and improving them over time may substantially help people to better understand *a same objective reality* concerning day-to-day problems' structure, which they usually perceive differently because of their several *mental models*. Such a learning process leads to improve decision makers' mental models and helps them to achieve a common shared view of reality. Achieving a common shared view is not a symptom of *conformism* (i.e. forcing people to adopt a common vision); it is instead, a result of a *learning process*, which stems from the comparison and coherent combination of the variety of frames through which things are implicitly or explicitly perceived. Making mental models explicit and sharing them in an organisation is not an *end* per se; it is, a means through which people are helped to raise proper questions on relevant business issues. The main concern of learning in and about complex systems is not simply to find the *right solutions to problems*, but *to understand their deep causes*. Furthermore, learning is not to be conceived as a contingent activity, but instead as a *continuous* process. In fact, in a complex and dynamic context, *freezing* such a learning process in a bounded time horizon could not allow decision makers to respond to future outcomes. Matching SD and accounting models into flexible and user-friendly computer-based *microworlds* can provide learning environments to support decision

makers in a timely perception of the effects produced by negative (balancing) feedback loops (Richardson, Pugh, 1981), which make growth slower, giving rise to a resource waste for the company. Such an awareness may allow the firm to better explore the opportunity to pursue new policies, in order to reinforce the same or to enhance other positive (reinforcing) loops. Likewise, decision makers can also be helped in understanding how to counterbalance positive loops associated with vicious circles and in detecting policy levers to be adopted in order to enhance negative loops to foster business stability. An interactive *data* exchange between accounting and SD models is likely to be more supportive to decision makers. The difference between them does not mean that they are mutually alternative, but instead that they are complementary as they may satisfy different information needs (Bianchi, 1996). Figure 3 shows how matching SD and accounting models allows one to feed *double loop learning*, which supports mental models' improvement through an analysis of business phenomena, which are observed according to the feedback view. Such an approach, at the same time, is likely to exploit, to make explicit and improve what are probably the most important strategic assets in a small firm: entrepreneurial *experience*, *perceptions* and *tacit knowledge*.

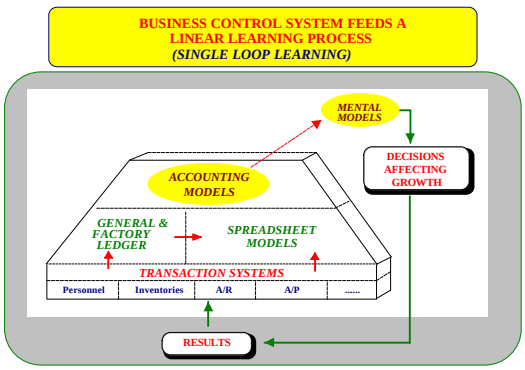

Fig. 2 - Single loop learning from the use of only accounting models to support business planning

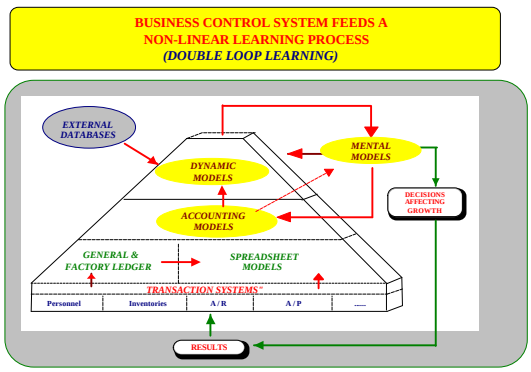

Fig. 3 - Double-loop learning from a combining system dynamics and accounting models

6. Exploring dynamic interrelationships between commercial, financial and equity subsystems in a small firm: a case study

An example illustrating how a 'microworld' can support policy making in a small firm

through the analysis and diagnosis of feedback loops affecting operational growth, liquidity and profitability is provided in the last section of the paper (Coda, 1984). It will be shown how exploring dynamic interrelationships between different internal and external subsystems may allow decision makers to pursue a sustainable growth, in compliance with both business and the equity-owning family available resources.

Relationships between growth, liquidity and profitability have been traditionally analysed through the so called s*ustainable growth model* (Zakon, 1966). This model suggests that growth could be internally sustainable if net assets growth rate is not higher than the retained earnings growth rate. The model also suggests that, if the cost of borrowings is lower than the return on net assets, growth can be pursued by increasing debts: in fact, a correct use of *financial leverage* is likely to increase net profitability and to generate new financial resources to enhance growth. Although such a model is one of the cornerstones in the financial literature, it is more useful for *ex post* analyses, rather than to support entrepreneurs in planning for growth. In fact, it does not make explicit causal variables impacting on profitability and assumes that a linear relationship exists between "debts-to-equity" ratio and cost of borrowing. Moreover, it does not take into account the delays and dynamic relationships between growth, profitability and liquidity.

6.1 Drawing up a budget in a learning-oriented approach

Spinnato & Sons is a family-owned business which distributes to manufacturing firms a brand of wood-cutting machines. Mr. Spinnato is the owner/entrepreneur. He makes intuitive decisions, mainly based on his knowledge and "flair for business". In the wider business *arena*, four main forces interact with the firm: competitors, customers, banks and the Spinnato family. A fragmented offer and strong competition characterise the industry. Spinnato's customers are very sensitive to price discounts, changes in terms of payment and lead (delivery) time policies. Banks grant a maximum credit on current loans. This allows the firm to finance its current monetary needs by increasing negative bank accounts. Each month

a minimum withdrawal from company bank accounts is done by the equity-owning family to feed its current expenses. The family is also used to require an extra level of withdrawals, when it perceives that the company is growing. Mr. Spinnato is now drawing up an operating budget. How decision making related to the budgeting process can be supported by accounting and SD models?

The budget, including financial, profit & loss and flow of funds statements, is initially drawn up through a spreadsheet model, based on linear relationships and computations, regardless delays between causes and related effects. On the basis of such expected outcomes, the entrepreneur is able to adjust his own policies in order to *fine-tune* them with desired goals (e.g., in terms of sales revenues, market share, current income, cash flow, debts-to-equity ratio). Decisions are made quarterly and concern sale price, terms of payment allowed to customers, lead time, withdrawals to family assets, investments from family assets, and allowed extra current family expenses. According to adopted policies, future sales volumes are assessed by Mr. Spinnato. After the first year budget has been drawn up, the same decisions are simulated through an SD model, which shares with the spreadsheet a same database, but also takes into account feedback loops, delays, non-linear relationships and *soft* variables that is very hard to include in a spreadsheet model. SD simulated results are automatically transferred to the spreadsheet file. From a window, decision makers may analyse variances between the original spreadsheet budget and related simulation results generated by the SD model. Variance analysis is aimed to foster a deeper understanding of causal relationships among variables driving business results. Figure 4 depicts the above commented budgeting process, based on a learning-oriented spreadsheet and SD model environment. Combining spreadsheet and SD simulation into a ‘microworld’ allows decision makers to close the *learning process* loop. In fact, the *traditional budgeting process* is based on a *single loop* approach which implies a comparison between actual and standard values and *ex post* variance analysis, that may feed back to modify the initial budget hypotheses

(figure 5). However, according to such an approach, decision makers' mental models may not be questioned by them when actual and budgeted data are compared. In fact, quite often people are more used to focusing their attention on the computation of such variances and their division in *sub-variances*, rather than on the analysis and interpretation of their real causes. Conversely, matching SD with spreadsheet budgeting approach allows decision makers to *ex ante* reformulate the budget, according to a more careful analysis of the inter-related forces which drive business performance. Such an approach is oriented to capture feedback loops between relevant (internal and external) variables, delays and non-linear relationships, in order to improve key-actors' mental models, thereby fostering *double loop learning* (figure 6).

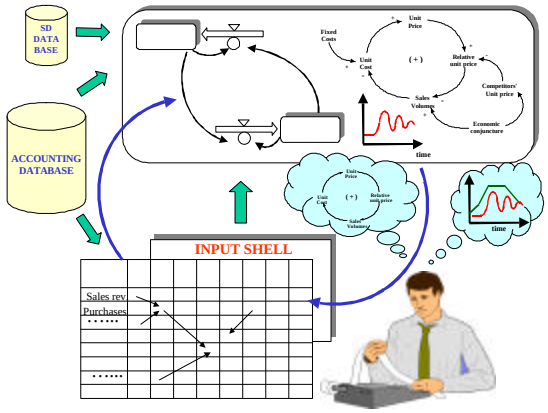

Figure 4 - Budgeting learning-oriented process

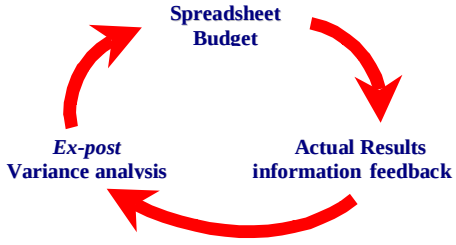

Figure 5 – Traditional single loop budgeting approach

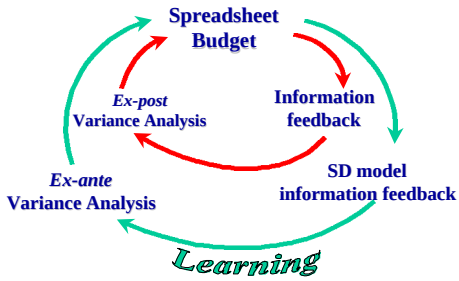

Figure 6 – Double loop learning in the budgeting process

Such an approach is usually adopted not only to simulate budget policies, but also to understand dynamics portrayed in balance sheets, related to decisions made in the past. In order to give more concrete insights on how a 'microworld' supporting analysis and policy making can be used in a small firm, a scenario will be now commented on. This is an example of irrational and emotional company policies, based on a mismatch between

commercial and financial sub-systems (figure 7). In order to increase market share and sales revenues, the entrepreneur progressively rises the terms of payment during the first year and decreases prices in the second year. Such policy gives rise to four main consequences: 1) market share and sales revenues gradually increase, due to a slow rise in terms of payment; 2) in spite of higher sales revenues, the current income slightly increases and reaches a limit to growth earlier than sales revenues (this behaviour is due to both a decrease in unit sale price and a rise in interest costs on negative bank accounts); 3) net working capital shows a pattern of behaviour that mirrors current income, leading to a negative cash flow [iv] which fully absorbs equity-owner's initial investments; 4) investments from personal assets progressively decrease average family satisfaction.

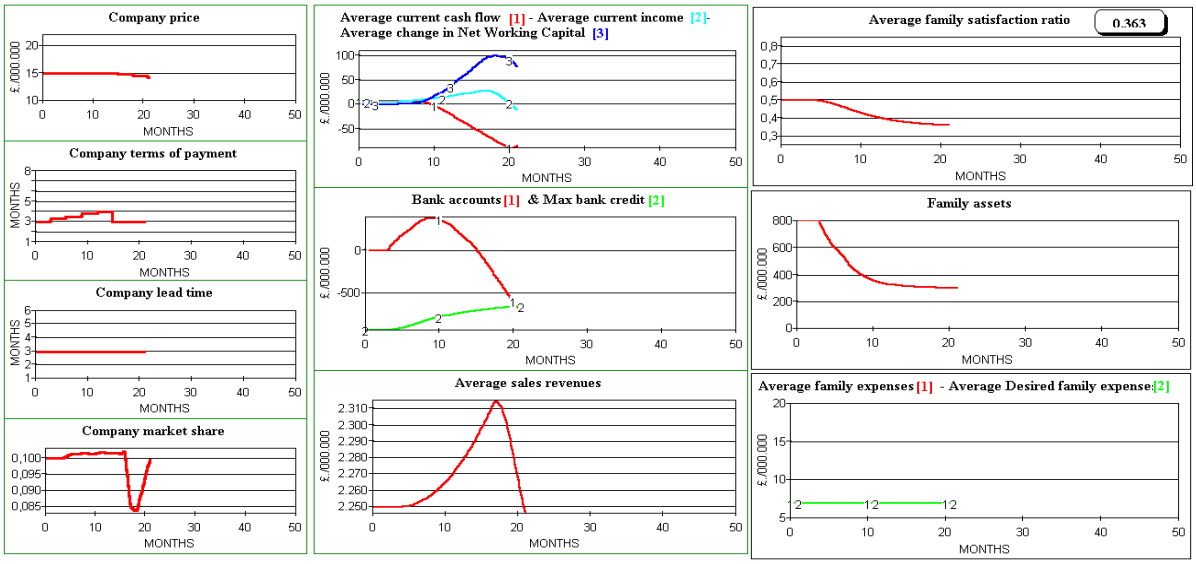

Figure 7- Business and Family Graphs

Around the 15th month, the entrepreneur realises that the business' financial structure does not allow the above strategy to sustain; another limit to the market share increase is also found into competitors' reactions to terms of payment increases. In order to overcome the above limits to market share growth, the entrepreneur decides to shift from a *terms of payment* to a *price based* commercial policy. In the entrepreneur's mind, resetting terms of payment to their initial value would have allowed the firm to immediately restore both the net working capital and liquidity. At the same time, such a strategy was intended to foster an

increase in both market share and sales revenues. However, the expected outcomes are sharply different from achieved results. In fact, as figure 7 portrays, from around the 15th month, both market share and sales revenues dramatically fall, leading to a negative current income and still to a negative cash flow. Such behaviour originates from a delay in: *a)* competitors' reaction to the decrease in company's terms of payment, leading to a lower market appeal of the firm; *b)* customers' perception of company price decrease; *c)* market share increase which does not compensate the decrease in price. The result of this scenario is failure, that is mainly caused by the exploitation of allowed maximum bank credit. It is worthwhile to observe that maximum bank credit shows a decreasing pattern over time (in absolute value), because of a family assets decrease and a "debts-to-equity" ratio increase.

From the above scenario one can learn that resetting a policy lever to its initial value does not necessarily imply that the system is restored to its initial state. In fact, current policies contribute to change the structure of the environment in which the firm operates. In other words, it is not only the internal environment that determines business performance: in fact, the way the firm interacts with a wider range of "actors" (clients, competitors, banks, etc.) operating from outside must be taken into consideration in order to understand business dynamics as a condition for policy setting (Forrester, 1994).

6.2 Feedback analysis

The scenario commented above can be analysed through a causal loop approach. A first positive loop emerges from the effects generated by terms of payment increase. After a delay, such an increase gives rise – *ceteris paribus* – to an increase in customers, which determines higher sales revenues and current income. A higher current income implies a growth in the cash flows (given an unchanged net working capital), which increases bank balance and available bank credit. An increase in perceived available bank credit allows the entrepreneur to rise terms of payment again (figure 8). However, growth in sales revenues, income and cash flows, based on a terms of payment policy may be counterbalanced, sooner or later, by

liquidity shortages caused by a net working capital increase. Such an increase is due to the higher sales revenues and higher average terms of payment allowed to customers. When the increase in accounts receivable and average inventory is not offset by an increase in accounts payable (due to terms of payment negotiated with suppliers), the change in net working capital will decrease cash flows. That will reduce available bank credit. If the entrepreneur realises that a liquidity shortage might slow down growth, he will soon either stop increasing terms of payment allowed to customers or will increase equity, through investments from family assets. The entrepreneur could also restore the debts-to-equity ratio and reduce terms of payment growth rate. It is a matter of finding a *fine tuning* between the average level of terms of payment and equity invested in order to tackle the dominance of the negative feedback loop originating from the net working capital (figure 8). Whereas financial shortages are not promptly perceived and corrective policies are not adopted, further increases in terms of payment will give rise to a higher net working capital which will worsen liquidity even more. Eventually, negative bank accounts will produce interest costs that will progressively increase bank debts (positive loop), on a side, and will reduce the current income, cash flows and bank accounts (positive loop), on another side [v]. The effects generated by terms of payment (and, more generally, commercial) policies are not limited to the internal business system. In fact, such policies will cause competitors' reactions, aimed at filling the gap in terms of payment. Adjustments in competitors' policies will reduce the increase in the customer base that the firm will be able to obtain as a consequence of its commercial policies (negative feedback loop of figure 9). On the other hand, competitors' aggressive commercial responses will increase the potential market. This will increase – *ceteris paribus* – the number of customers that the firm will be able to get from the market (positive feedback loop of figure 9). Figure 10 and 11 provide a wider insight into the main feedback loops associated with commercial policy levers operated by the entrepreneur. Fig. 13 particularly shows relevant feedback loops related to the *business-family overlap*: the

more perceived current income and cash flows increase, the higher number of family withdrawals requests will result. A positive loop characterises the relationship between family requests and bank withdrawals allowed by entrepreneur. In fact, an increase in family current withdrawals is likely to stiffen family requests on a higher level. However, the spiral "withdrawal requests for current expenses ⇒ withdrawals actually operated on business bank balances ⇒ withdrawal requests for current expenses" can be counterbalanced – sooner or later – if the entrepreneur perceives two emerging negative feedback loops associated to escalating withdrawals. In fact, on the one hand the increasing liquidity withdrawals give rise to lower bank balances. On the other hand, being such withdrawals an interim dividend on perceived profits, they would cause a decrease in business equity (net worth), leading to a higher "debts-to-equity" ratio that would determine a lower liquidity, because of a weaker business perceived solvency, resulting in a lower available bank credit.

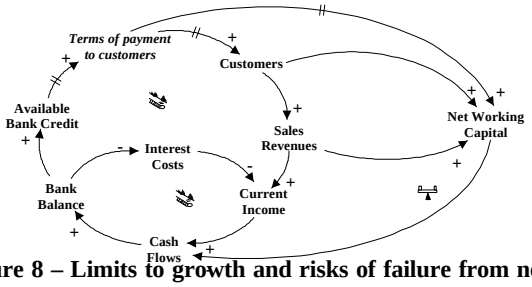

Figure 8 – Limits to growth and risks of failure from net working capital dynamics

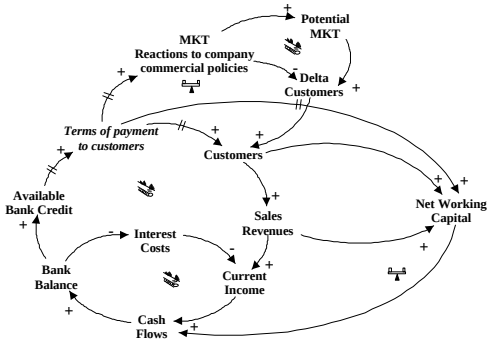

Figure 9 – Competitors and customers' reactions to company commercial policies

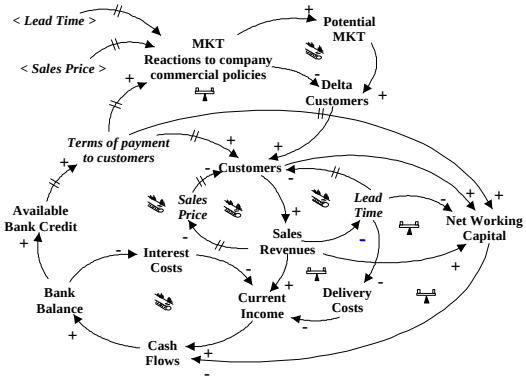

Figure 10 – Main feedback loops related to company commercial policies

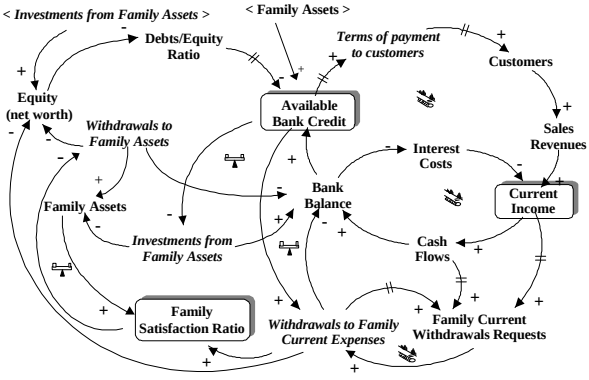

Figure 11 – Main feedback loops related to business-family relationships

As previously said, misperception of inter-relationships between commercial, financial and family sub-systems may lead to company failure. In order to avoid such risks, decision

makers may invest new resources from family assets into the firm (negative feedback loop "investments ⇒ bank balance ⇒ available bank credit ⇒ investments"). Nevertheless, the above investments may cause a lower family satisfaction, which could also lead to a business crisis [vi]. The entrepreneur may overcome such threat through withdrawals of liquidity from bank accounts to increase family properties (negative feedback loop).

Balancing withdrawals and investments to achieve an adequate family satisfaction ratio that is compatible with business liquidity, and matching commercial policies with financial structure are the key to survival and growth of both the business and the family. Three main *key performance indicators* resulting from the above analysis are: current income, available bank credit and family satisfaction ratio.

7. Conclusions

To summarise, a *microworld* matching the accounting and SD approach to support small business growth management is likely to help policy makers in understanding:

- effects of current commercial policies on the financial structure in the medium-long term;
- limits to sales growth generated by the financial structure;
- limits to sales growth generated by competitors' policies and potential market;
- perils from symptomatic solutions to liquidity shortages;
- perils from escalating aggressive commercial policies in response to competitors' reactions;
- perils from irrational liquidity withdrawals due to bias in profit and cash flow expectations, to increase the equity-owning family "quality of life".

Another important outcome which emerges from the above remarks is that decision makers ought to set their policies not only on the basis of their internal environment, but also based on the dynamic relationships between the firm and external actors (competitors, customers, suppliers, banks, etc.) with whom it interacts. Exploring relevant system

boundaries is not a matter of building huge models, but instead of selectively understanding how external sub-systems interact with the firm.

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[i] It is worth remarking that such a schema does not pretend to drastically split three aspects this issue, as they are inter-related. We only want to depict a systematic picture of the investigated phenomena.

[ii] According to this view, while strategic control should have to support long range planning, management control should support implementation.

[iii] *Maieutics* is a Socratic mode of inquiry, oriented to bring out a person's latent ideas into clear consciousness.

[iv] Current cash flow = Current internal flow of funds - Δ Current net working capital

[v] The above feedback loops embody the implicit nature of current changes on policy levers operated by decision makers. In particular, when the firm operates in fragmented markets, where competition is strong, decision makers often redefine day-by-day sale conditions for different customers, many entrepreneurs are usually not able to perceive how their *contingent decisions* (e.g. terms of payment allowed to a particular customer for a given supply) contribute to change the *state of the system* (e.g. average terms of payment). "Learning to see slow, gradual processes requires slowing down are frenetic pace and paying attention to the subtle as well as the dramatic" (Senge, 1990; p. 22-23).

[vi] In fact, a lower family satisfaction ratio may give rise to contrasts among family members, that would reduce the confidence towards the entrepreneur and involve him in making emotional and reactive business decisions.