

COMPUTER-AIDED VISIONING AND LEARNING-ORIENTED MODELS: A NEW EDGE FOR SMALL BUSINESS PLANNING

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Abstract

Many unresolved issues plague the field of academic research and practitioner debate surrounding the role and value of planning in the small firm, though a recognized obstacle to the introduction of any formal system is the simple lack of time and resources. Conversely, it has been demonstrated that planning can be a powerful lever in pursuing change and growth, in small firms as in larger ones. The main thesis of this paper is that the scientific debate on SME planning should not only concern the planning activity *per se*, but also the *rationale* upon which decision making process is based. In also questioning the value of traditional planning approaches in the precarious situation of the growing small firm, this paper proposes a *learning-oriented* modeling approach to small business planning. This approach can build the critical bridge between the informal planning and entrepreneurial thinking of the SME manager, and the formal plans upon which many growth ambitions are predicated.

1. Introduction

Planning and decision making in SMEs are a puzzling research topic on which both scholars and practitioners have long been debating. The major issues on which the scientific debate has been focused are related to whether business planning...

1. ... *is beneficial* to the management of small firms' growth (Schwenk, Shrader, 1993; Robinson, Pearce, Vozikis, Mescon, 1984; Bracker, Pearson, 1985);
2. ... must differ, according to the particular *growth stage* of the firm (Churchill, Lewis 1983);
3. ... ought to be based on *formal or informal* documents and *structured or unstructured* procedures (related, e.g., to data acquisition, "actors" involved, and information provided), on *simple or sophisticated* techniques (for example, Unni, 1981; Armstrong, 1982; Shrader, Taylor, Dalton, 1984; Orpen, 1985; Sexton, Van Auken, 1985; Watts, Ormsby, 1990; Matthews, Scott, 1995);
4. ... ought to be articulated on different *hierarchical levels* (corporate, business unit and functional area) and focused on several responsibility centers, or instead only oriented to corporate activities (Robinson, Logan, Salem, 1986);
5. ... ought to be done either on a *regular* basis (e.g. at the beginning of each financial year) or, instead, *occasionally* (e.g. in the start-up stage or in order to get loans and/or financial grants from private or public institutions);
6. ... ought to be *rational*, rather than *intuitive* (Mintzberg, 1973; Quinn, 1980; Fredrickson, Mitchel, 1984; Bhide, 1994; Matthews, Scott, 1995).

A widely recognized obstacle to the introduction of planning and budgeting systems into SMEs has been the simple lack of time and resources, human and financial (Robinson, Pearce, 1984). On the other hand, it has been demonstrated that planning can be a powerful lever in pursuing change and growth, in small firms as in larger ones (for example, Shuman, 1975; Ackelsberg, Arlow, 1985; Gibb, Scott, 1985; Braker, Keats, Pearson, 1988; Foster, 1993).

The main thesis of this paper is that the scientific debate on SME planning should not only concern the planning activity *per se*, but also the rationale upon which decision making process is based, that is, how goals and policies are implicitly or explicitly set by decision makers. Further, the paper addresses the peculiarities of decision making and managerial processes in SMEs, especially in familyowned firms, as well as the role that external actors may play in small business planning, and the sources of data, the methodologies and tools on which the planning process may rely.

The paper also discusses the potential for, and implementation issues in the introduction of *computer aided visioning* (CAV) tools, based on learning-oriented models for small business planning (Bianchi, Winch, Grey, 1998; Gibb, Scott, 1985). It demonstrates how such a learning-oriented perspective can support small business entrepreneurs in critical challenges of understanding how current decisions affect future growth, coping with major change, and envisaging the future business system, and the linking of informal strategy with formal plans.

2. Growth as a major goal, and learning as a prerequisite for growth.

Frequently, small business owner-entrepreneurs pursue growth as an explicit or implicit goal through which they aim to satisfy different needs, such as:

- *self-esteem* -- growth may allow them to successfully put into practice their business ideas, winning over their direct competitors, providing employment to the community, etc.;
- increasing the business-owners *family assets* and *quality of life*;
- *financial autonomy* -- growth is often pursued to guarantee long-term family security and stable job opportunities for the entrepreneur's children and/or other family members;
- *keeping pace with industry trends* -- for example, in response to technological innovation, potential market size, consumer tastes, or competitors' aggressive policies;
- *better exploiting opportunities* from available resources (see Penrose, 1959, chapter 5);
- *surviving the start-up phase* and building a robust long-term business.

(Of course, growth can be also perceived by entrepreneurs as only a minor goal -- see, for example, Airoldi, 1988 on marginal firms, and Julien, Marchesnay, 1988 on craftsmen-owned firms; Penrose, 1959, discusses other situations).

Although there may be several factors determining a business's quantitative -- that is dimensional -- growth, it will always be the case that qualitative growth (Coda, 1988), at least, is a major goal against which entrepreneurs have to evaluate their decisions. Firms have always to be oriented towards understanding the systems within which they operate, in terms of market needs, competitors' and clients' behavior, causes and effects of decisions and pressures, delays between policies and results, etc. To this end, *all firms need to learn, and learning is the prerequisite for growth*. But this in turn raises the issue of to what extent conventional planning and control systems are likely to support small business entrepreneur's learning and analysis of how to manage growth?

3. Business planning and small firms' critical growth stages.

A useful framework to focus the potential role of planning for small business growth management is provided by Churchill and Lewis (1983). Their model stems from an analysis of the literature concerning the life-cycle of organizations (Rostow, 1960; Steimetz, 1969; Greiner, 1972; Normann, 1977; Scott, Bruce, 1987). Churchill and Lewis proposed a non-deterministic approach, based on five different sequential phases of development for a growing small firm -- existence, survival, success, take-off, resource maturity. Each phase is characterized by an index of size, diversity and complexity and described by different management factors, among which business planning and control systems play an important and different role according to the particular growth stage of the firm.

The *Existence* stage concerns business start up (Bhide, 1992). The main problems are related to building a sufficient customer and sales base, and to getting the necessary liquidity to feed initial financial needs. A critical resource is equity-owner's entrepreneurial ability in managing by him/herself all relevant business functions, matching personal and business goals and finding proper monetary resources. When the firm reaches the second stage (*Survival*) it has demonstrated itself to be a workable business entity. It has accumulated a minimum credibility in its market, and is able to satisfy its customer base with its products. Critical resources are the same as in the previous scenario. Cash management is particularly critical, as cash flows from consolidated products have to feed financial needs from current operations and to support growth (i.e. investments in new products, processes, management systems, human resources, etc.). In the survival stage, the company may either grow in size and profitability and move on to the next stage, or remain at this phase for some time, earning marginal profits and possibly eventually going out of business.

Even though, in the above two stages, systems and formal planning may be minimal to non-existent and the company's strategy is simply to consolidate its market position remain alive, drawing up a formal business plan either for internal or external use (for example, in relation to a loan application) or even sketching an informal plan in the entrepreneur's mind may be very helpful to support growth management awareness. In the last decade, there has been a growing trend of small firms utilizing formal business plans as a modeling tool in the start-up phase; a major reason for this phenomenon is that such a document is usually a prerequisite to acquiring grants from public funds or bank loans. Typically, however, entrepreneurs have viewed drawing up their business plans as a bureaucratic constraint, rather than a learning tool, which may help them to be aware of the business formula that is going to be adopted. The outcome of such a mechanistic perspective is a static and non-systemic document emerging from the aggregation of disparate data (e.g. commercial, financial, statistical, macro-economic, etc.) that do not assist the entrepreneurs understanding the structure of the dynamic system in which their firms will operate. The third and subsequent stages are really outside the scope of this article -- the Churchill and Lewis model defines the firm as large and complex and the role of formal planning and of computer-supported strategic planning is well established and documented. Nonetheless, a *learning-oriented* approach ought to characterize planning and decision making, regardless of the firm's maturity or its evolutionary stage, and the level of formalization of such processes. Awareness of the system within which the business operates, emerging from a continuous learning process based on questioning and understanding causes and effects between and among key-variables, is the way to open up entrepreneur's mind to the very real questions to face in order to set goals, policies and action plans. For example:

- How to frame the firm and its competitive system?
- How to map relationships between the firm and financial institutions, the businessowning family, customers, competitors, etc?
- How to estimate the time it takes to attain expected results, as a consequence of a given set of adopted policies?
- To what extent business quantitative growth is a healthy condition for the firm?

Not untypically, for instance, a crisis is caused by attempting to growing too fast, e.g. by generous payment terms allowed to customers or too sharp a reduction in delivery time and/or prices, in an attempt to increase market share. While such "aggressive" commercial strategies may lead to higher income in the short term, they often cause a financial crisis in the longer term. In such cases, the entrepreneur may not understand why growth, which initially led to higher sales revenues and profits, suddenly threatens the firm's survival. He/she cannot see the causes of a drastic and progressive reduction in working balances, despite increasing sales revenues. Likewise, it seems a contradiction that significant "order backlog" cannot be filled because of stock unavailability. Sometimes it can be also unclear the rationale of customers' behavior, who reduced their demand, in spite of aggressive commercial strategies of the firm.

Conceiving business planning in a *learning-oriented* context may allow the entrepreneur to foresee the future stages of business growth and, consequently, to understand the best timing for increasing efforts in building a specific set of strategic assets and other relevant resources that will allow the firm to move to the subsequent stages. Such an approach to business planning is likely to support entrepreneurs' understanding of cause-and-effect relationships between cash flows generated or absorbed by consolidated and new products, as well as the trade-off between support and development investments (Wolstenholme, 1990). Another important decision area that could be improved is related to the understanding of the dynamics generated by commercial policies on sales revenues, current income and cash flows in a short and longer time horizon. For instance, a prolonged increase in terms of payment allowed to customers could give rise to a growing net working capital (Bianchi, Mollona, 1997; Bianchi, Bivona, 1999), leading to lower liquidity and, other conditions being equal, higher "debt-to-equity" ratio, and higher interest costs in the longer term negatively impacting on profitability. The misperception of such dynamics and the risk of failure could be also increased by inaccurate short term liquidity withdrawals, based on higher profit expectations, that would even more increase the "debt-to-equity" ratio and prospective business solvency. From the above remarks it emerges that, although the higher flexibility and reduced scope of the business system in the first two stages of growth might discourage the use of formal and structured planning systems, the entrepreneur always needs a learning support which might help him/her to understand the structure of firms' operating environment. Framing the *planning process as learning* implies the ability to recognize the critical determinants of that system's behavior and the firm's consequent performance within it. This ability involves decision makers identifying the relevant feedback structures, policies, external constraints, and time delays between actions and related effects. In this perspective, drawing up business plans according to a learning-oriented approach is a philosophy intersecting and enriching the planning process, regardless the level of its formalization and the growth stage of the firm.

Such an approach may, in particular, provide substantial help to new entrepreneurs in rationalizing their business ideas, assessing better their feasibility and profitability, and more easily communicating them to potential funders. This will serve to ease their business ventures through the next growth stages. Nevertheless, in order to adopt such an approach to planning and decision making in a small enterprise, two main critical issues must be taken into account:

- entrepreneurs' personal business attitudes;
- the availability of flexible and user-friendly modeling methodologies and software tools.

4. Factoring in entrepreneurs' personal business attitudes and other main "actors"

In order to get 'big firm' strategic thinking and planning into SMEs, it is necessary to consider the peculiarities which characterize management complexity in smaller firms, and which may discourage any kind of systematic replication of approaches commonly adopted in bigger company practice. The main complexity factors in small firms are related to their: *a)* lack of a professional management team and other qualified resources like manpower and finance, *b)* tight overlap with the equity-owning family (Landsberg, 1983), *c)* weaker 'relative weight' in the market, *d)* difficulty to get relevant information for decision making, and *e)* entrepreneur's unwillingness to delegate. These and other small business-specific complexity factors may lead to a higher environmental unpredictability and to a more blurred boundary between the short and long term in decision making. This implies that small business entrepreneurs are often completely involved in current activities and, consequently, that managing small firms is often a matter of a continuous effort aimed at escaping from unexpected external or internal events. It is a kind of 'muddling through' which very often does not allow for formal or conscious judgment and planning of strategies. From these considerations the conclusion does not emerge, however, that small firms do not need to plan for their future. On the contrary, and 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 business goals.

Understanding the strategic impact of current decisions in the longer-term requires higher discrimination in business planning and control systems; indeed, while current management takes place on an on-going basis, not all day-to-day decisions have the same level of strategic importance. It follows that, other conditions being equal, it is completely different detecting weak signals of strategic change if one refers to current activities, than in long term investment options which are oriented to change a firm's *business formula*. While in the first case, the structure of the system to be managed (important variables, the connections between them, delays, etc.) can usually be defined more easily, monitoring strategic relevance of current events suggests a difficulty in detecting weak signals in advance of change, as they are usually concealed in a wide range of daily occurrences in which the entrepreneur is fully involved.

The need for more selective and small business-oriented planning systems does not match well with the lack of resources and the bounded small firm environment. In fact, both empirical findings from past research (Hutchinson, Ray, 1986) and preliminary results from around twenty interviews conducted by the authors with small firms, consultants and funders located in the Devon and Cornwall, region of the UK and in Sicily, show how small business entrepreneurs are typically absorbed by day-to-day operational problems. They have neither time nor staff to invest in strategic planning, and tend to make decisions primarily on the basis of their experience and intuition. The field research also suggests that small business informal plans (or strategic thinking) and any formal plans prepared for purposes of loan/grant applications are seldom linked. The formal plans are then equally seldom used as management tools, implying an analysis of mismatches between expectations and results. Another important issue that has been raised by our field study has been the limited use by SME entrepreneurs of knowledge and

information from their network of contacts. Related to this issue, is the desire from bankers/grant agencies to exchange thinking and share information. However, the lack of tools and shared methodologies of inquiry to support the exchange process suggests the need for a different approach to small business planning and strategic decision making, that might go far beyond the physical boundaries of the firm. In fact, although such business contexts might appear as the least suitable for any kind of planning, a learning-oriented approach could allow the exploiting of the key entrepreneurial assets -- creativity and "flair for business" -- and the mental databases key company 'actors', which can become a powerful engine for growth.

In order to deal with this 'dilemma', a significant role in educating small business entrepreneurs can be played by those 'actors' involved from outside the firm in the business planning process, (Bianchi, Winch, Grey, 1998; Robinson, 1982). Figure 2 (identifies) the principal external stakeholders. Particularly during start-up and expansion stages, *professional accountants* and other *advisers* may be asked by entrepreneurs to draw up formal business plans, typically to support applications for financial grants or to obtain credit from banks. Both the procedures to be followed and the information that such plans have to provide are usually standardized by those institutions who give grants, such as *public trusts*, *banks* and other financial entities. For example in Italy, the Ministry of Industry sets standards (according to the law n. 488/1992), with spreadsheet model software provided, to be followed by entrepreneurs in drawing up their business plans for grants to finance longterm investments. Likewise, business trusts (for example, the *Società per l'imprenditorialità giovanile S.p.A.* in Italy and the *Prince's Youth Trust* in the UK), formed to finance and/or encourage new firm startups, typically define standards for business plans. A very important role in promoting new entrepreneurship is also played by *private trusts*, who also help proposers to identify weaknesses in their business ideas through formal plans, though typically these are drawn according to less standardized processes.

The above categories of external stakeholder could significantly help entrepreneurs to utilise business planning as a fundamental step to determining future growth, rather than as a bureaucratic constraint to be undertaken by accountants or advisers using standard formulae and simple extrapolation. In such cases, a pre-requisite for such a "shift of mind" is that the above "actors" also include among their roles the promotion of a new business culture oriented towards learning. Figure 3 (offers) a picture of how different actors could contribute to a business planning process leading to a written document, according to different growth stages of the small firm. It shows how the support of professional accountants, banks and public and private trusts can be significant, especially in the first two stages of development. Even though the business planning process has to be standardized by funding bodies -- in order to guarantee uniformity in criteria used for proposals evaluations, and firms resort to business planning only occasionally, a learning-oriented approach is suggested to involve entrepreneurs (and their professional accountants) in understanding the logic which lies behind values embodied within the plan. This will allow a smoother introduction of business planning in the firm's culture, and will help in moving towards the next growth stages, where the firm will plan more regularly and will develop plans based on critical functional areas.

5. Applying advanced modeling techniques to support small business planning

Popular approaches to planning in SMEs involve spreadsheet models and/or accounting packages. Spreadsheet simulation modeling, based on balance-sheet data extrapolation on a periodical basis, can help decision makers to better understand dynamics related to business growth. Often though, such an approach does not allow decision makers to adequately face their strategic information needs. In reality, spreadsheet models generally lack flexibility (Shrage, 1991): they are usually based on a linear, static and narrow approach. Their perspective is *linear* and *static* as it is based on the extrapolation of balance-sheet data and omits to consider feedback loops; it is *narrow* as it does not make explicit some relevant variables, like for instance competitors' policies. Simplifying systems analysis allows the reduction in complexity, but complexity and unpredictability ought to be understood and properly handled through the modeling. This focuses on:

- interdependencies between variables
- relationships (including non-linear) between policy levers and affected variables
- delays between causes and effects.

Standard accounting packages may prove useful in a small firm, but they do not always present the most consistent and appropriate answer to strategic business information requirements. Being based on analytical and hierarchical databases which give rise to a detailed reporting, they frequently do not fit in small firms for three main related reasons...

1. ... they are founded on the assumption that somebody (e.g. a controller) in the firm should be in charge of reporting analysis to feed the control process;
2. ... reporting that is delivered by industrial accounting is usually related to responsibility centers in order to allow managers to support performance evaluation and budgeting procedures -- however, small firms are often lacking in a technostructure and necessary formal procedures (Brusa, 1986; Bianchi, 1996);
3. ... the entrepreneur and collaborators usually do not have enough technical competence nor enough time for detailed analysis, diagnosis and formulation of corrective action.

The higher system complexity and unpredictability is, the bigger is the risk that current decisions are taken without questioning the consistency of entrepreneurs' 'mental models'. In order to overcome such weaknesses, a so-called *double loop learning* approach is advocated which allows decision makers to evaluate consistencies in their "mindset", i.e. the way how they frame problems and strategic issues (Argyris, Schon, 1978; Kim, Senge, 1994). The methods of *System Dynamics* allow the entrepreneur to make mental models explicit, to assess their consistency and to improve them. A dynamic simulation model may also be developed based on explicit statements of policies underlying the decision making process, according to conditions arising within the system. Following this systems feedback view, decision making is seen as a continuous process of converting information into signals which feed actions oriented to change system states (Forrester, 1994; Richmond, 1994). The emerging *computer-aided visioning* (CAV) concept, based on the System Dynamics methodology are designed to provide, not accurate predictions of the future, but a realistic and engaging vehicle to stimulate managers into reconsidering the ways of doing things and perhaps to adjust their mental models (Winch, McDonald, Sturges, 1997). Different stakeholders in the firm can then compare and share their new emerging view of, for example, how to prepare for major change. The use of generic structures that can be easily and quickly tailored to an individual firm (Arthur, Winch, 1998) can bring this kind of management support to the situation of change in SMEs. This could, at least in part, overcome the disadvantages experienced by SMEs against larger competitors, who will have more experience of fundamental change management, more scope to bring in managers with their key skills, and less reliance on internally appointees in times of major change (Winch, McDonald, 1999). The same tools could also substantially help entrepreneurs to timely detect the perils related to a lack of understanding of how their current decisions may impact on longer term performance.

Making decision processes more explicit through models, and improving them over represents an organizational learning process which leads to improve executives' mental models and helps them to achieve a common shared view of reality (Winch, 1993). Such learning-oriented CAV models critically:

- improve learning of the system as an holistic entity
- improve effective communication among key-actors;
- identify policy levers and evaluate possible different effects in the short and long term;
- improve the key-actors continual experimentation;

- improve an inter-functional approach to management problems. This benefit is very important also in a small firm, although its organization structure is usually very simple, as it allows an entrepreneur who is oriented towards one function to perceive implications for other sub-systems;
- provide a flexible user interface; possibly as easily modified so-called '*microworlds*'.

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 organization is not an end *per se*; it is, rather, a means through which people are helped to raise proper questions on relevant business issues (Forrester 1968; Morecroft, 1994; Vennix, 1996). The main concern of learning in and about complex systems is not simply to find the right solutions to problems, but instead to understand their deep causes (Serman, 1994). Fundamentally, learning should not be conceived as a contingent or discrete process, but instead as a continuous one.

6. Concluding remarks and implications for future research

This paper has identified an apparently well-known but nevertheless critical deficiency in business planning in smaller enterprises. Such firms frequently prepare formal business plans for the purpose of gaining funds, either as commercial loans or through a variety of governmental or charity grants. However, there is no guarantee that formal plans prepared to meet the needs and criteria of a funding body actually assist the entrepreneur in understanding the dynamics of his/her firm. Anecdotal evidence from preliminary fieldwork confirms that such entrepreneurs are likely to have separate ideas, mental models, or even formal plans that serve the operational needs of the firm, and that these may be different in significant ways from any plans submitted to outside agencies. There appears therefore to be a potentially dangerous conflict in that no single, agreed vision of the firm and its future is available to the internal and external stakeholders in the firm.

The analysis in this paper has investigated the critical issues in business planning in smaller firms, and the role and expectations of key actors in the funding of them in relation to these plans. In considering the various modeling approaches to support the planning process a rationale has been offered for adding dynamic modeling -- specifically via system dynamics -- to this process in order to bridge the gap between internal plans and plans developed with, or delivered to, the external actors. In a preliminary way, fieldwork has also confirmed the potential acceptability and desirability of this addition. The entrepreneurs interviewed frequently acknowledged that they did not always fully comprehend the dynamic consequences of their plans and that they would welcome support in improving this. There was also a feeling expressed that greater professionalism and rigor in planning process, both on the part of entrepreneurs and their advisers, would be beneficial to all.

It is recognized that system dynamics has probably not impacted on smaller firms to the extent that it has with major corporations. This is most likely to be due to its sheer cost and time requirements not matching the benefits to the smaller firm. However, consortium arrangements and use of generic models may ease this constraint. Research is now advancing through a consortium comprising the lead researchers based in Sicily, Italy, and the Southwest peninsular of England, agencies that fund and support small firm start-up and development, and entrepreneurs and small enterprises themselves. It is anticipated that there will be an orientation, at least in the early stages, towards organizations that are characteristic of the two regions identified. These both have relatively low economic bases, and owing to their locations at the periphery of the European Union experience common problems of logistics and dying traditional industries. They consequently have a specific emphasis on wealth- and job-creation through small firm development. The research is targeted towards the development of a practical integrated planning/learning process for smaller firms, and has two related foci:

1. The development, refinement and validation of the taxonomy for system dynamics interventions in smaller firms.
2. The creation of software that can combining formal business planning with operation planning and learning. In this second objective, design criteria for the software recognize the inherent problems of cost and engagement of entrepreneurs in the planning process, particularly where quantitative analysis and modeling is involved. The specification therefore is for software that is very easy and attractive to use, and that can easily and quickly calibrate basic planning model structures to the individual firm. It is envisaged that a computer-aided visioning tool comprising and interrogatory interface linked to a dynamic model with a flight simulator-type working space will provide just such a vehicle for this process.

7. References

- Ackelsberg R., Arlow P., (1985), "Small Businesses do plan and it pays off", *Long Range Planning*, 78, 5
- Airoldi G., (1988), "*L'evoluzione degli Aspetti Organizzativi nello Sviluppo delle Dimensioni di Impresa*" in VV.AA., *Piccole e Medie Imprese e Sistemi di Direzione*, Giuffrè, Milano.
- Argyris C., Schon D., (1978), *Organizational Learning. A Theory of Action Perspective*, Addison Wesley, Reading Mass.
- Armstrong J., (1982); "The Value of Formal Planning on Strategic Decisions", *Strategic Management Journal*, 3, 3.
- Arthur, D., Winch, G. W. (1998) "Strategic Model Conceptualisation using Resource and Stakeholder Service Fulfilment Concepts" *Procs. of the 10th European Simulation Symposium*, Nottingham, Oct.
- Bhide A., (1992), "Bootstrap Finance: The Art of Start-ups", *Harvard Business Review*, Nov.-Dec.
- Bhide A., (1994), "How Entrepreneurs Craft Strategies That Work", *Harvard Business Review*, March-April.
- Bianchi C., (1996), *Modelli Contabili e Modelli "dinamici" per il Controllo di Gestione in un'ottica Strategica*, Giuffrè Milano.
- Bianchi C., Bivona E., (1999), "Commercial & Financial Policies in Small and Micro Family Firms: The Small Business Growth Management Flight Simulator", *Simulation & Gaming* (ed. by Davidsen P., Spector M.), Sage Publications.
- Bianchi C., Mollona E., (1997); "A Behavioural Model of Growth and Net Working Capital Management in a Small Enterprise", *Procs. of the Int. System Dynamics Conf.*, Istanbul.
- Bianchi C., Winch G. W., Grey C., (1998), "The Business Plan as a Learning-oriented Tool for Small/medium Enterprises: A Business Simulation Approach", *Procs. of the Int. System Dynamics Conf.*, Quebec.
- Braker J., Keats B., Pearson J., (1988), "Planning and Financial Performance among Small Firms in a Growth Industry", *Strategic Management Journal*, 9.
- Brusa L., (1986), "L'Amministrazione e il Controllo delle Piccole e Medie Imprese", in VV.AA., *L'Economia delle Piccole e Medie Imprese Industriali*, Clueb, Bologna.

- Churchill N., Lewis V., (1983), "The Five Stages of Small Business Growth", *Harvard Business Review*, May-June.
- Coda V., (1988), *L'orientamento Strategico Dell'impresa*, Utet, Torino .
- Forrester J., (1968), "Market Growth as Influenced by Capital Investment", *Industrial Management Review*, 2, 9.
- Forrester J., (1994), "Policies, Decisions, and Information Sources for Modeling", in *Modeling for Learning Organizations* (ed. Morecroft J., Sterman J.), Productivity Press, Portland, OR.
- Foster M., (1993), "Scenario Planning for Small Businesses", *Long Range Planning*, 26.
- Fredrickson J., Mitchel T., (1984), "Strategic Decision Processes: Comprehensiveness and Performance in an Industry with an Unstable Environment", *Academy of Management Journal*, 27.
- Gable M., Topol M., (1987), "Planning Practices of Small Scale Retailers", *American Journal of Small Business*, 12, 2.
- Gibb A., Scott M., (1985), "Strategic Awareness, Personal Commitment and the Process of Planning in Small Business", *Journal of Management Studies*, 22, 6.
- Greiner L., (1972), "Evolution and Revolution as Organizations Grow", *Harvard Business Review*, July-Aug.
- Julien P., Marchesnay M., (1988), *La Petite Entreprise. Principes d'économie et de Gestion*, Vuibert, Paris.
- Hutchinson P., Ray G., (1986), "Surviving the Financial Stress of Small Enterprise Growth", in *The Survival of the Small Firm* (ed. Curran J., Stanworth J., Watkins D.), Gower, Brookfield.
- Landsberg I., (1983), "Human Resources in Family Firms: The Problem of Institutional Overlap", *Organizational Dynamics*, 12, 1.
- Matthews C., Scott S., (1995), "Uncertainty and Planning in Small and Entrepreneurial Firms:an Empirical Assessment", *Journal of Small Business Management*, October.
- Mintzberg H., (1973), "Strategy-making in Three Modes", *California Management Review*, 16.
- Morecroft J., (1994), "Executive Knowledge, Models and Learning", in *Modeling for Learning Organizations* (ed. Morecroft J., Sterman J.), Productivity Press, Portland, OR.
- Normann R., (1977), *Management for Growth*, Wiley.
- Orpen C., (1985), "The effects of long-range planning on small business performance: A further examination", *Journal of Small Business Management*, 23, 1.
- Kim D., Senge P., (1994), "Putting Systems Thinking into Practice", *System Dynamics Review*, 10, 2-3.
- Penrose E., (1959), *The Theory of the Growth of the Firm*, Wiley, New York.

- Quinn J., (1980), "Strategies for Change: Logical Incrementalism", *Sloan Management Review*, 20.
- Richmond B., (1994), "Systems Thinking/System Dynamics: Let's Just Get On With It", *System Dynamics Review*, 10, 2-3.
- Robinson R., (1982), "The Importance of 'Outsiders' in Small Firm Strategic Planning", *Academy Of Management Journal*, 25, 1.
- Robinson R., Logan J., Salem M., (1986), "Strategic versus operational planning in small firms", *American Journal of Small Business*, 10, 3.
- Robinson R., Pearce J., (1983), "The impact of formalized Strategic Planning on Financial Performance in Small Organizations", *Strategic Management Journal*, 4, 3.
- Rostow W., (1960), *The Stages of Economic Growth*, Cambridge University Press, Cambridge.
- Schwenk C., Shrader C., (1993), "Effects of Formal Strategic Planning on Financial Performance in Small Firms: a Meta-Analysis", *Entrepreneurship Theory and Practice*, Spring.
- Scott M., Bruce R., (1987), "Five Stages of Growth in Small Business", *Long Range Planning*, 3.
- Sexton D., Van Auken P., (1985), "A Longitudinal Study of Small Business Strategic Planning", *Journal of Small Business Management*, 23, 1.
- Shrader C., Taylor L., Dalton D., (1984), "Strategic Planning and Organizational Performance: A Critical Review", *Journal of Management*, 10, 2.
- Shrage M., (199 1), "Spreadsheet: Bulking up on data", *Los Angeles Times*.
- Shuman J., (1975), "Corporate Planning in Small Companies. A Survey", *Long Range Planning*, 8, 5.
- Steimetz, L. (1969), "Critical Stages of Small Business Growth: When They Occur and How to Survive Them", *Business Horizons*, February.
- Sterman J., (1994), "Learning in and about Complex Systems", *System Dynamics Review*, 10.
- Unni V., (1981), "The Role of Strategic Planning in Small Business", *Long Range Planning*, 14, 2.
- Vennix. J., (1996), *Group Model Building*, Wiley.
- Vozikis G., Mescon T., (1984), "The relationship between stage of development and small firm planning and performance", *Journal of Small Business Management*, 22, 2.
- Watts L., Ormsby J., (1990), "Small Business performance as a function of planning formality: a laboratory study", *Journal of Business and Entrepreneurship*, 2, 1.

Winch G. W., (1993), "Consensus Building in the Planning Process: Benefits From a 'Hard' Modeling Approach", *System Dynamics Review*, 9, 3.

Winch, G. W., McDonald, J. (1999) "SMEs in an Environment of Change: Computer Based Tools to Aid Learning and Change Management", *Industrial and Commercial Training*, April.

Winch G. W., McDonald J., Sturges S., (1997), "Frameworks and Tools for Computer-Aided Visioning", *Procs. of the Int. System Dynamics Conference*, Istanbul, SD Society.

Wolstenholme E., (1990), *Systems Inquiry: A System Dynamics Approach*, Wiley, Chichester.

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