



The strategic micro-firm: a role play in management training for dynamic businesses

Federico Barnabè

Department of Social and Business Studies, University of Siena, Siena, Italy

Cristiano Busco

National University of Ireland, Galway, Galway, Ireland

Pål I. Davidsen

Department of Geography, University of Bergen, Bergen, Norway, and

Maurizio Lambri and Gianfranco Zatta

GMV Consulting, Milan, Italy

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Abstract

Purpose – The purpose of this paper is to present the main characteristics of the role-playing game “Strategic Micro-Firm” which aims to reproduce the fundamental features of a complex supply chain.

Design/methodology/approach – A specific role-playing game is presented, in which a Balanced Scorecard is used as the reporting device and is the main tool for analysing players’ performance. The research design and the typical outcomes of several gaming sessions are discussed.

Findings – The paper illustrates the strengths of using this specific role-playing game as a means for training managers to face complex and dynamic issues, such as the supply chain.

Research limitations/implications – Depending on the features of the specific game and the interaction taking place, different kinds and various degrees of learning and performance improvements can occur. Therefore, it is not possible to provide a generalization.

Practical implications – The paper shows that gaming can play a relevant role in management training, providing free and safe environments in which players can face decision-making issues and problem-solving challenges.

Originality/value – The paper demonstrates how a specific role-playing game maybe used in management education/training to incentivize improvements in problem-solving skills as well as in communication and coordination. Role playing could be used for support in designing supply chain management policies, providing a safe, simulated environment where managerial strategies may be explored and discussed before their implementation. The paper’s originality relates to the adoption of the Balanced Scorecard as the main reporting and performance assessment tool for the gaming experience.

Keywords Managers, Roleplay, Management development, Management training, Game theory, Management education, Performance appraisal, Balanced Scorecard, Strategic management, Supply chain management

Paper type Research paper



Introduction

The virtues and usefulness of role-playing games, and business games in general, in management training and student education have been demonstrated, as seen in a

large body of literature relating to several decades of application (Crookall, 2012), and a variety of simulations and business games can be found covering a large number of research fields, from operation management to strategic management, healthcare to military defence, renewable resources to ethics (Shubik, 2009).

Based on contributions in the fields of education, experiential learning and individual/organisational learning (Argyris and Schön, 1978; Kolb, 1984; Kim, 1993; Argyris, 1993), gaming and simulations are considered useful and powerful tools, able to stimulate decision-making skills and support processes of knowledge elicitation and different types of learning.

These games, moreover, are particularly useful when the simulated reality under analysis is related to complex and dynamic business domains (Kriz, 2003). In these environments, the high level of hierarchies among the constituent elements, the presence of time delays, and the interplay over time of a high number of decision makers, may be analysed and understood within a safe virtual environment, able to provide the basic conditions and tools for sustaining and fostering thinking, creativity, reflection and discussion (Serman, 2000; Morecroft and Serman, 2000). In particular, direct experience is regarded to be a fundamental factor in the educational and learning process (Senge, 1990) sustained by role-playing games and business simulations (Gentry, 1990) because they are aimed at creating opportunities for participation and interaction, communication and knowledge sharing, reflection and strategic thinking of learners (Kolb, 1984). Based on these considerations, this article presents a role-playing game, “Strategic Micro-Firm”, aimed at reproducing the main features of a complex supply chain (SC).

The article is structured as follows: first a section on background information explores the main features and goals of role-playing games; this is followed by a section that focuses on the performance measurement system known as the Balanced Scorecard; subsequently, the specific role-playing game is presented, including its research design, key data and some typical outcomes; in conclusion, the discussion of findings and the final remarks are reported.

Main characteristics and aims of role-playing games in management education and training

The debate about which educational methods and learning tools should be chosen in different contexts and for different purposes has received great attention over the past decade. The debate has been particularly lively when taking into consideration management education/training programmes in which learners are called on to face complex and dynamic business domains (Serman, 1992; Wirth, 1992; Graham *et al.*, 1992; Lengnick-Hall and Sanders, 1997; Berggren and Söderlund, 2008). Specifically, quite recently there has been an increased use of new methodologies and tools able to create opportunities for participation, interaction and direct experience, communication and coordination, knowledge elicitation and knowledge sharing, learning and improvement in strategic thinking and team working skills (Serman, 2000; Morecroft and Serman, 2000). In particular, role-playing games have been given a higher relevance and are increasingly used in management training programs to pursue the above-mentioned aims (Elgood, 1997).

A business game can be any kind of simulation and role-playing game capable of artificially reproducing specific business systems with their operating conditions and decision-making rules. As highlighted by Crookall *et al.* (1987, p. 147), simulation and role playing can be seen as tools for representing “some real-worldly system, as a symbol with a referent, and thereby drawing its essential meaning from that referent. However, during performance participants do not necessarily see things in this way. For them simulation is a very real experience”, able to have an impact on their personal mental models (Vennix, 1996) and to modify the rules and routines (Argyris, 1993; Sterman, 2000) from which they usually take decisions and develop strategies.

Taking into account these considerations, in this article we subsequently regard role-playing games and business games as tools that are useful for providing a safe environment in which players can interact within a simulated business domain, experience first hand the working and managerial conditions of the business context, directly observe the consequences of the policies and actions carried out (Börner *et al.*, 2012) and be able to transform the new knowledge acquired through experience into practical skills and competences (Lewis and Maylor, 2007). Finally, role-playing games are also regarded as suitable tools for developing improved forms of collaboration, cooperation and “co-production” of knowledge between academics and practitioners (Smeds, 1997), especially if used in management training.

In summary, if correctly designed, role-playing games respond to a “pull approach” to learning (Santos and Powell, 2001), providing opportunities, conditions and a secure environment in which participants can be active, interact and experiment freely with ideas and strategies while challenging their own mental models, beliefs and assumptions.

However, role playing and business games may also suffer from some limitations. Among them, some authors (Sims and Hand, 1975; Anderson and Lawton, 1992; Wolfe and Crookall, 1998; Washbush and Gosen, 1998) have highlighted the problematic issue of performance assessment in simulated environments as well as the difficulties in developing a deep and complete understanding of the realities investigated within those games. In this regard, even though performance enhancement is frequently cited as one of the main advantages of role playing (Salas *et al.*, 2009), not many studies have discussed in detail which tools might be used to assess or measure such improvements in performance and, at a later stage, how to make sense of those outcomes to subsequently support learning and strategy formulation (Gosen and Washbush, 2004).

In particular, it is necessary to note that performance measurement involves the measurement of task performance and manager/learner skills. Moreover, it also refers to the evaluation of task-related knowledge and user attitudes. Therefore, a set of performance metrics should be identified or defined which are strictly related to the task for which training is being performed and with the aim of actually representing the players’ outcomes.

When dealing with dynamic domains, i.e. with contexts in which the variables are subject to change not only due to time elapsing but also because they are influenced by the strategies continuously implemented by the players over time (Warren, 2008), the task of measuring performance acquires a greater relevance, indicating the actual

outcomes (of both individuals and of teams) and the degree of strategic goal achievement.

Considering the elements mentioned above, the overall performance measurement system used in the gaming experiment should help the evaluator to assess how well a player performs the task he/she has been assigned and also to understand the potential impacts that are generated at the systemic level by the actions he/she carries out. Therefore, the performance measurement system, known as the Balanced Scorecard (BSC), may be adopted as a suitable and reliable tool. Further details are provided below.

Using a Balanced Scorecard to assess gaming results and players' performance

The BSC is a performance measurement system that was first theorized by Kaplan and Norton (1992, 1996). This system provides a holistic approach to performance measurement, being able to link an organization's performance metrics in four main perspectives – financial, customer, internal business processes, learning and growth.

Each perspective shows both current operating performance metrics as well as the drivers of future performance, being based on lagging and leading indicators. The lag indicators are outcome measurements and indicate the results of a strategy; the lead indicators are driver measures, aimed at illustrating incremental changes that eventually will affect the outcomes. Financial measures are usually lagged and they are subsequently linked to various leading indicators included in the other perspectives. Overall, the four perspectives can be viewed as an interlinking hierarchy, with cause-and-effect relationships linking the strategic objectives and the parameters included within the scorecard (Kaplan and Norton, 2004, p. xii).

An additional feature of the BSC framework is related to the use of specific mapping tools referred to as Strategy Maps (Kaplan and Norton, 2000, 2001, 2004). A strategy map is a diagram that describes how an organization creates value by connecting strategic objectives that are in explicit cause-and-effect relationships with each other into the four BSC perspectives.

Furthermore, the BSC enables simultaneous control of several key performance areas through specific key performance indicators (KPIs) that are linked by cause and effect relationships, and graphically represents such indicators and their causal linkages, thus contributing to an improved formalization and understanding of the systemic structure of the specific business domain under analysis[1].

When used as the reference system for performance evaluation in a gaming experience, the BSC framework offers great potential because it can enable the players to grasp the sense of their actions, continuously monitoring their performance and improvements. Above all, the BSC would also support the players in correctly identifying the main causal links within the simulated business domain, and therefore help them to understand what are the specific leverage points to be considered within the system under analysis, in order to develop better policies and improved forms of coordination and cooperation within their teams.

All of the above considerations are contextualized in the presentation of the main features of a specific role-playing game, the "Strategic Micro-Firm", in which learners

are challenged to manage the high levels of complexity and dynamics associated with a typical SC, and subsequently develop feasible supply chain management (SCM) policies.

Presentation of the strategic micro-firm game

The role-playing game presented in this article is the “Strategic Micro-Firm”, hereafter referred to as “Micro-F”. The game, originally developed in 2000[2] by a consulting company, has been implemented, not only in several settings in higher education (e.g. in Master’s programs), but also in a variety of management training programs with private firms.

The game aims to reproduce the main operational features of a typical manufacturing SC, with attention placed on a specific firm (Micro-F) that is asked by its customers to produce a variety of different types of finished goods on demand. However, in its simplified gaming configuration, and in order to keep the degree of complexity at a sustainable level, Micro-F produces one main product (a routing device – similar to an axle shaft) in four different customizations for the reference market.

Each finished product is made of five different parts that are assembled together: one base; one bearing; one pin; one cover; four screws. In addition, the finished product is packaged and the packaging is customizable in different ways.

The simulated SC integrates a raw material supplier, the Micro-F company, two external contractors, one external logistics company and a customer.

The overall SC can be consequently represented as follows (Figure 1):

The fundamental input to the process is represented by the market orders placed by the customer. In the basic gaming configuration, the customer is required to place an order of six products per simulated month and keep the level of orders stable for the entire game. However, the incoming orders may be grouped into any casual combination of the four different product customizations sold by the company.

Depending on the orders received, Micro-F is called on to face a series of decision-making tasks, the first being the definition of an inventory safety policy, developed according to demand forecasting. Simultaneously, the management team has to define a raw material order policy and develop its production schedule, to be transferred to the production manager and the production operators. During the simulation, as soon as the raw materials are acquired and stored within the raw

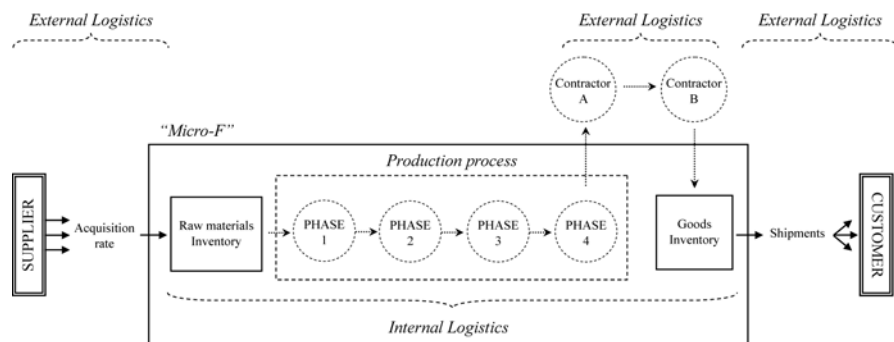


Figure 1. Simplified representation of the simulated SC

materials inventory and depending on the production schedule developed by the management team, the production process may start.

In order to fully assemble the products, Micro-F also relies on two external contractors. Through the experience of dealing with external contractors the players learn to integrate different actors into the same SC and are called on to immediately face a trade-off in terms of costs and benefits in a typical “make or buy” situation. The product is then returned to the company and stored within the finished goods inventory, waiting to be delivered to the customer, thus completing the entire process.

Goals and organizational design

One of the primary educational objectives of a role-playing game centered on a SCM environment is experiencing and teaching how it is both possible and necessary to simultaneously control and take into account material, information and financial flows, and thus develop coordinated, shared and sustainable policies. It is important to note that most of these tasks and activities are more easily understood and controlled when interpreting a managerial role within the gaming experience.

Therefore, in order to provide a comprehensive learning environment for all the participants, the game should provide the players with an opportunity to experience different roles and various managerial decisions/problems.

With this in mind, the Micro-F game is normally played by a group of participants that can be composed of up to 24 people and is run over a two-day session, allowing players to switch roles from day-to-day. In particular, the main roles that the participants are required to play within the game are defined according to a comprehensive organizational chart including, among others, all the key managerial roles (e.g. executive director, production manager and quality assurance manager), the basic operational roles (e.g. the operators assigned to specific production phases and the logistics operators) and the external roles (e.g. customer, supplier, external contractors). Specific details regarding the gaming environment of “Strategic Micro-F” are provided in the following table (Table I).

In particular, the game aims at creating a “model” (i.e. a simplified representation of the reality under analysis) of a typical real organization operating within a complex business domain, in which the players are expected to coordinate, communicate and cooperate in teams.

To organize their work and define feasible strategies, the players are assigned specific goals to pursue, as follows:

- micro-F aims to be the leader in its reference market; therefore;
- all products must be delivered to the customers on time; and
- overall financial management of the firm should be supported by the cash flow generated through its functioning.

Building on the general goals mentioned above, the facilitators of the game explain the main strategic themes to be taken into consideration by the participants, as follows:

- increase the firm’s value;
- efficiently manage all the internal processes;

1	Duration of the game	The game is played over a two-day session Each day includes briefing sessions, game time and debriefing
2	The role-playing organizational design	Each player is assigned a specific role within the simulated SC. On the second day the roles may be switched among the players in order to let each participant play at both managerial and operational levels
3	Time horizon of the game	12 months. Each simulated month lasts 15 “real” minutes
4	Objectives	Deliver goods on time Maximise customer satisfaction Raise operating profit Increase the firm’s value The KPIs are defined on the basis of the previous objectives. The KPIs are subsequently identified through the four perspectives of the Balanced Scorecard (economic; customer; internal processes; learning and growth)
5	Performance outputs	
6	Additional features	The game may include inconveniences, such as machinery failures Capacity constraints are also imposed
7	Teaching support materials	Player’s guide Micro-F organizational chart Micro-F strategic plan Micro-F Strategy Map and Balanced Scorecard reports Teaching notes

Table I.
Key features of the gaming sessions

- assure a high level of customer satisfaction; and
- develop internal skills over time.

These strategic goals are consequently translated into key results and a Strategy Map is used to visualize the pattern of cause and effect links characterizing Micro-F, as shown below (Figure 2).

As previously mentioned, the BSC system is used during the game not only to correctly report gaming data, outcomes and the level of the actual results registered by Micro-F in comparison to the pre-set goals, but also with the objective of properly evaluating the players’ performance. The KPIs identified for Micro-F and included within the BSC cockpit are shown in detail below (Table II).

Typical results

Within the simulation the players are immediately called on to face a start-up problem: the beginning of the gaming session is structured to have the players running a company with no inventories and no goods under production. The company, on the contrary, receives a market order each month, starting at time zero. Overall, the players are immediately under pressure to meet the customers’ orders and activate the production line.

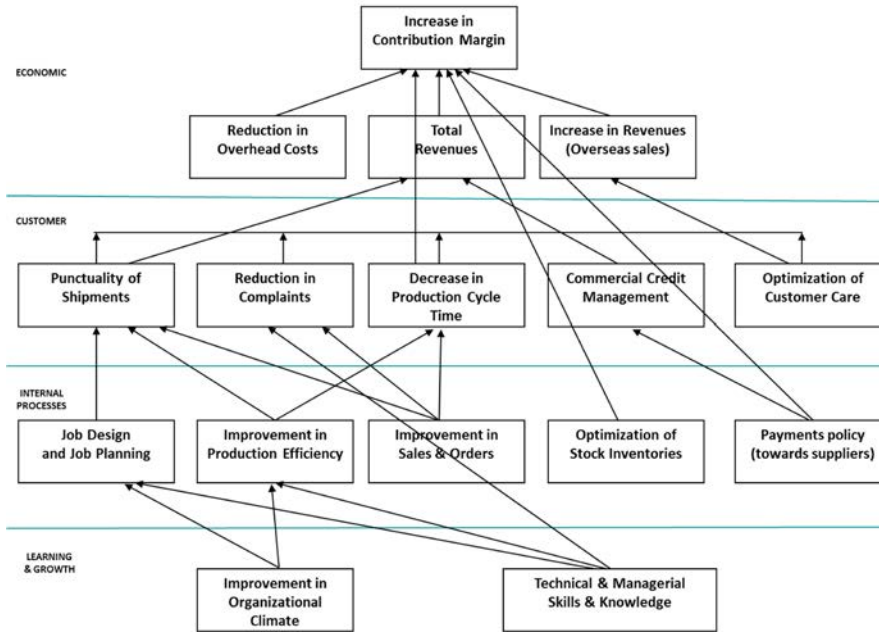


Figure 2. Micro-F Strategy Map

Financial perspective	Customer perspective
Net revenues	Punctuality of shipments
Contribution margin	Customer satisfaction
Overhead costs/goods sold	Percentage of orders completed
Net revenues (new customers)	
Internal processes perspective	Learning and growth perspective
Number of goods manufactured	Organizational climate
Raw materials inventory rotation (%)	Efficacy of information flow management
Plant usage (%)	Capacity for self-improvement
Number of reworks	Planned activities/activities carried out
New customers	
Returned goods	

Table II. Table I Micro-F Balanced Scorecard KPIs

This situation is fundamental within the context of the participants' experiential learning process, since it requires a coordinated effort to cooperate, share information and quickly understand the features of the game, as well as the interrelationships existing between market demand, raw material acquisition, production rates and product delivery.

While addressing these complex decision-making issues, the game immediately highlights the role played by delays (i.e. time lags) in managing all the stages of a complex and long SC. Furthermore, the simulated SC is affected by both material delays (i.e. shipping delays) and information delays (i.e. order processing delays).

These delays eventually affect individual/collective demand forecasting and impact on activities carried out within the SC and orders placed outside of the company.

Taking into consideration all of these variables, typical results from the role-playing game frequently show some difficulties at the beginning of the simulation. The players are usually overwhelmed by the degree of complexity and dynamics that characterize the simulated SC. Moreover, they are unable to correctly understand the cumulated impacts generated by the different typologies of time delays and face huge problems in terms of coordination and communication within their teams, being unable to properly manage all the information and material flows moving across the SC.

These problematic conditions are further aggravated by the following three factors:

- (1) First, the players' attitude during the first steps of the game usually leads them to "act locally ignoring the global system and its interrelationships". Being a role-playing game, each person not only brings into the game his personal experiences, knowledge and beliefs (in brief, his/her mental model), but also has the tendency to adopt a local optimization strategy ignoring overall team results and the consequences provoked by his/her actions on the whole SC. Specifically, the players usually need some simulated time to become more assertive and communicative, thus overcoming their personal defensive routines (Nelson and Winter, 1982).
- (2) Second, the players' understanding of the simulated environment is hampered by the difficulty in overcoming organizational and physical barriers across the SC. In this regard, one of the main lessons of the game is to become aware of the systemic connections and decisions within Micro-F, going beyond any local working position, both in operational or decision-making terms (Senge and Sterman, 1992).
- (3) Third, the presence of time delays generates inertia within the system, lagged outcomes and even side-effects of the actions carried out by the players. As well demonstrated by the literature (Sterman, 2000), time delays are a fundamental cause of oscillatory behaviors in complex systems when not well identified, understood and addressed. Therefore, it is important to note that the initial months of simulated time are usually characterized by over-aggressive policies implemented by the players, especially in terms of ordering raw materials. This behavior produces a negative side-effect, well known in SC contexts as the "bullwhip effect", responsible for a destabilisation of ordering patterns and material flows and subsequently of huge amplifications along the SC.

Understandably, all these elements usually lead to poor performance at the beginning of the game. For example, in most of the gaming sessions the players are not able to produce and deliver any finished good to the customer for a simulated time between three and four months. As a consequence, Micro-F registers not only very poor economic and financial outcomes, but also bad performance in all the other key performance areas.

However, the role-playing game also provides the context and the tools needed to learn and improve during the simulation.

First, with the advice received by the facilitators during the briefing and gaming sessions, the players have a chance to call a number of time-outs in the game, thus

interrupting the simulated time in order to organize short briefings in which communication, knowledge sharing, coordination and strategy formulation are usually the most common issues that are addressed.

Second, the players are subjected to a “learning by doing” process during the game (Zgodavová *et al.*, 2001), thus improving their operational skills.

Third, the players receive reporting data and information feedback at the end of each quarter. As previously mentioned, the game provides data according to the BSC architecture, aimed at supporting the players in correctly understanding the outcomes of their actions and the systemic nature of the environment in which they are embedded. In particular, the use of the BSC is meant to allow the players to:

- grasp the sense of their actions, by continuously monitoring their performance and improvements;
- identify the main cause-effect links within the simulated business domain, thus understanding what are the leverage points within the system under analysis; and
- subsequently, define better policies and develop improved forms of coordination and cooperation.

As a consequence, typical results show steady and sensible improvement in performance over the complete simulated horizon time. The initial conditions of poor performance, bottle-necks along the SC and low customer satisfaction are substituted by an overall improvement and better results, as shown in the following Figure (Figure 3).

Lastly, the final step of the process, the debriefing phase, requires supporting the players in fully understanding the systemic structure of the business domain under analysis.

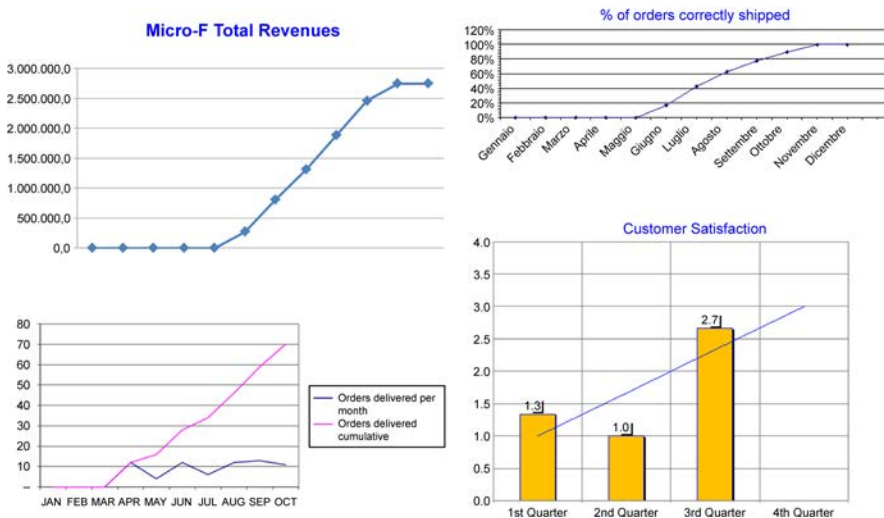


Figure 3.
Micro-F typical main
outcomes

Lessons learnt, discussion and final remarks

In most cases, the debriefing leads to the identification of three specific underlying causes for the participants' poor performance and overall management inefficiencies:

- incomplete understanding of cause-effect linkages across the SC;
- lack of coordination and communication among the players; and
- high level of complexity within the simulated environment.

Further details are provided below.

(a) Incomplete understanding of cause-effect linkages across the SC

A role-playing game based on the functioning of a complex SC is not as easy to play as it may seem. Participants often adopt local optimisation and individual performance maximisation without taking into proper account the numerous causal relationships existing within the SC and the subsequent necessity to identify leverage points within the system. Moreover, the players tend to take decisions relying on their past experiences and personal mental models, not always trying – especially at the beginning of the game – to develop coordinated and shared feasible policies.

(b) Lack of coordination and communication among the players

Lack of cooperation and collaboration, miscommunication and bad information flows are key reasons for the generation of bottle-necks, inefficiencies and huge oscillations along real, and simulated, SCs. By analysing the Micro-F game, however, it is important to note that the players are “catapulted” into a role-playing experience where they feel the pressure and the stress generated by time, financial and material constraints. Moreover, they are pushed to make decisions very quickly, continuously reacting to external factors, such as market demand and customer (dis)satisfaction. The overall experience requires a definite effort to cooperate and communicate, even though information is not fully available at the beginning of the game (the BSC outcomes are communicated only at the end of each simulated quarter) or it is not always fully understood.

(c) Complexity of the simulated environment

Modern SCs frequently have a quite complex and stretched structure. This structure primarily contributes to the creation of bottle-necks, oscillatory behaviours and amplifications along the chain. In particular, the presence of information and material delays tends to aggravate the generation of huge amplifications. In this regard, the literature shows how costly the incapacity to correctly understand and handle delays in complex business domains can be (Serman, 1992, 2000), and at the same time highlights the need for tools and methodologies that are appropriate for training managers how to face such dynamic issues.

In addition to the elements mentioned above, the debriefing phase of the game is specifically aimed at gauging the level of the participants' satisfaction. In this regard, in order to evaluate the potentialities and the outcomes of the project, the authors thought it would be useful to include direct quotations of some of the comments made by several participants in the game, at the end of the second day of simulation:

Learning from experience is the most effective way [...] I understood that sometimes the theory does not fit with the “real working life”. At the beginning it was traumatic, I did not expect to really work today [...] instead I have understood that the best way to a deeper learning is learning by doing, having concrete tasks. I also noticed that many mistakes can be a source of learning.

“Listening and putting ideas together has contributed to improve the flow of the materials”:

I have understood the importance of organisational roles, individual and collective behaviours and of the internal dynamics that a company has to handle to perform [...] I also realized which are the problems that we can create to our customers when we sell products and services of insufficient quality (sic).

Micro-F allows you to really understand how a company works and should be managed. We all have experienced that working together and cooperating allows us to obtain greater results than acting and taking decisions individually [...] Moreover, having had the opportunity of switching the role from one day to the other, I understood how different the problems and the strategic issues can be if seen from different angles[3].

As a final note, it is important to highlight that the use of the BSC is usually mentioned as a relevant support for deeper understanding, because it helps to give meaning to the participants’ conduct and focuses players’ attention on a limited number of KPIs, thus helping them understand the outcomes of the actions carried out.

In summary, this article presents the main features and discusses the basic functioning of a specific role-playing game used for management education and training. This game, and role-playing games in general, may be powerful and reliable tools for teaching participants how to face complex and dynamic business environments, such as SC contexts. When analysing and managing these domains, traditional methods of training and education are no longer sufficient and a greater relevance should be given to approaches based on direct experience, reflective observation and abstract conceptualisation.

It is the authors’ opinion that the game Micro-F provides these fundamental conditions, since within this simulated environment the participants are not only called on to face a role-playing situation, but they are also specifically supported in the lively experience of the daily working dynamics and problems characterizing any typical SC. In this regard, the Micro-F game reproduces most of the situations that normally characterize the daily operations of a company, because it:

- stimulates people to cooperate in teams and think in terms of team (and not individual) goals;
- supports processes of knowledge elicitation and knowledge sharing;
- facilitates individual and organizational learning;
- allows the development of a comprehensive vision of the production process and the main features of the reference market;
- promotes the development of a trans-disciplinary professional approach to SCM; and
- helps to bridge the gap between knowledge and action, facilitating the ability to transfer know-how to real working situations.

Finally, we emphasise that the use of the “Strategic Micro-Firm” is complementary to other traditional tools and educational approaches to management training, while it has a very specific focus on the ability to transfer a useful operating knowledge in an enduring manner.

Notes

1. In recent years, the Balanced Scorecard has attracted the considerable interest of many scholars who suggest its use for various purposes. This is demonstrated by the large number of articles highlighting its strengths and advantages, and by a variety of books containing case studies of private companies and public administrations that have adopted the BSC. For a literature review see Barnabè (2011).
2. The original Italian name of this role-playing game is “MinifabbricaStrategica”.
3. The anonymous sources took part in a survey, and consented to be quoted.

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Corresponding author

Federico Barnabè can be contacted at: barnabe@unisi.it