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## Business Games:

## Their Role in Training and Development

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**Abstract:** Since the appearance of business games, there has been a proliferation of papers dealing with the most various aspects of the uses of games. Nevertheless, for the last six or seven years, only a few studies have been reported on the subject, though we know that the number of games presently in use is pretty high.

This paper intends to give the reader an up-to-date picture of what business games are and for what specific purposes they are used or could be used. Our main objective is to study business games as a teaching and research device. A critical evaluation of the literature dealing with these uses of business games is made.

## INTRODUCTION

Before studying business games<sup>1</sup> and analysing their teaching and research potential, it is certainly worthwhile to say a few words about the notion of "game" itself.

One problem that we face when we are speaking about games, is that the word is easily connected with the idea of entertainment. While this is certainly a valuable and highly respectable result of game participation, it is not generally the main purpose of management game designers. Indeed, the latter also seem interested in the teaching and research applications of games. To avoid a misleading association of ideas, when we use the word "game" in this paper, we will be thinking with McKenney about a "competitive mental activity wherein opponents compete through the development and implementation of a strategy" [36, p. 2].

Although it is questionable that participants always refer to a clearly defined strategy to make their decisions, this definition has the merit of underlining the interactive and dynamic aspect common to most business situations.

In any business game it is possible to distinguish three basic components:

- the simulation model,
- the rules,
- the evaluation procedure.

The simulation model is itself a complex notion. It consists of two elements: the "model" which represents the particular environment to which the game is related (type of industry, specific market conditions, etc.) and the "simulation"<sup>2</sup> which refers to how the model is handled.

As pointed out by Philippatos and Moscato, simulation and gaming cannot be confused. "In the former, we are interested primarily in the behaviour of the system under observation, be it a mechanical or human system. In the latter, given a system and the computer program that simulates it, we are interested primarily in the behaviour of the active participants and the possible learning aspects that may occur from the observation of the simulated system" [42, p. 343].

The second element of the "gaming" notion is a set of rules which will define the nature of the possible interactions between participants and the simulation model. The designer should be specially cautious when he states them, for they will have a strong influence on the participant's motivation and involvement in the game. As a result these rules will condition the experience each participant will derive from the game.

The evaluation procedure refers either to the measurement of the performance of the different simulated firms involved in the game or to the evaluation of the extent to which the game objectives have been achieved. We will have the chance to appreciate the complexity of these evaluation problems throughout this paper.



### **The Origins of Business Gaming: Contribution of War Games**

Business games undoubtedly find their origins in war games. The American Management Association, which developed in 1956 the first widely used management game, had clearly stated this decisive influence.<sup>3</sup>

As it is not our purpose to study the evolution of war games<sup>4</sup>, we will just sketch some of their characteristics which are comparable to those of business games. We will also quote some factors which have underlined the similarities between war and business situations and so, have contributed to the development of management games.

#### **(a) Two conceptions of war games**

During the latest part of the nineteenth century war games developed along two different and nearly opposite paths. This gave rise to the two conceptions known as the rigid and free "kriegspiel".

At the outset, the first war games called upon the services of an umpire to direct the game. His role was to decide what to do when unusual problems arose during the play. He was also responsible for the evaluation of the game results. Soon, this practice was questioned and umpires were strongly criticised for their alleged arbitrariness. As a result, war game designers modified the games rules. They reinforced the existing ones and developed new rules. This movement toward highly structured games led to the development of "rigid" war games.

The same period was also characterised by an increasing use of modern mathematical apparatus by the military. This increased use of mathematical methods induced some game designers to develop very complex war models. As a result, criticisms appeared against the too theoretical and artificial nature of the resulting war games. The reaction was then to introduce real war data in the game so as to make it more objective and concrete.

These attempts to preserve the evaluation from the subjective judgements of umpires and to create games more comparable to real life war situations made the games almost unplayable. In fact, the large number of rules to be assimilated by the participants made it hardly possible for them to grasp the game "conditions". The reaction against these drawbacks was to rely again upon the experienced judgements of umpires and to make the games simpler. This movement led to the "free" school of thought. As pointed out by Cohen and Rhenman, these two conceptions corresponded to "the opposing demands of realist games and playable games". [13, p. 132].

#### **(b) Evolution from war games to business games**

We have already said that the first widely used business game was the American Management Association Top Management Decision Simulation developed in 1956. The question we are now raising is why it is only recently that the use of gaming has grown in the business field, while it had been widely known in the military for such a long time.

The reasons for this late development are both practical and theoretical. From the practical point of view, there was much less available data in the business field than in the military. This made it difficult to find a sufficiently large number of real data so as to simulate the business environment and be able to design valuable games for the training of managers.

On the theoretical side, designers lacked appropriate tools to develop business games similar to real life situations. For instance, the difficulty of expressing as a mode the overall effect of various interrelated environmental variables.

The greater availability of high speed computers has constituted a decisive step. Not only have they allowed the designer to use the resources of complex mathematical models without worrying about the subsequent calculation problems, but being increasingly used in the business field, they have contributed to solve the "real business data" searching problem mentioned above.

Last but not least is a business philosophy point. Today's managers tend to consider more and more their problems in a strategic context. This movement towards defining and evaluating different courses of action has also contributed to underline the similarities between action in the business and the military field. This in turn has stimulated the development of management games.

#### Short Classification of Business Games

There exists today a great number of games and there is a wide variety of them'. We will briefly present here the dimensions that are currently most used to classify them.

First, games may differ in the degree of *complexity* they incorporate. They range from the single product, single market, static game with only a few decisions to make, to the multiple products, multiple markets, highly dynamic games with hundreds of decision variables to be decided each period. As we will see later, the degree of complexity of a game is a very important issue, because of its impact on the cost of gaming, and on what can be learned from it.

Second, it is possible to distinguish between *interactive* games, where a team competes against other teams, and *non-interactive* games, where there is no interaction between different groups, but rather where players compete against the model.

Third comes the distinction between *general* and *functional* games. General management games are a representation of the firm as a whole, and include all major functions of the firm; the players are required to make decisions at the top management level. The majority of management games used for educational purposes are of that type. Perhaps the best known examples of general management games are the AMA Top Management Decision Simulation [1, 46], the Carnegie Tech Management Game [12, 14] and the IBM Management Decision-Making Laboratory [29]. In functional management games, the emphasis is on a particular function of a firm (finance [22, 23], production, [22], marketing [16,22] . . . ) and decisions are similar to those usually taken by middle managers.

Fourth, games may differ in their *purposes*. They can be used for training and teaching, or as a research tool. Since we believe that game objectives must condition (or at least should do so) the game design and characteristics, we have chosen to classify them along this last dimension.

We will first examine the uses of games for educational purposes.

## MANAGEMENT GAMES AS AN EDUCATIONAL DEVICE

### (A) Improving General Decision-Making

General management games are mainly used for teaching. The objective is the improvement of decision-making and the development of general decision-making capabilities.

An important part of the manager's task is to understand the environment he is working in, its structure and behaviour, and the different ways he has for acting on it. But this process of experience-building is very long, and it takes years before a manager can be said to be experienced. Moreover, it is difficult to appreciate the relevance and quality of the manager's image of his own task; this is due to some extent to the fact that we do not have a clear understanding of the manager's environment and consequently, we are unable to validate any manager's judgement otherwise than by reference to another manager's experience.

As, in a game the "world" is known to the instructor (although the dynamic behaviour of this "world" may be very difficult to understand, even for the designer), it is possible to some extent to criticise and evaluate the "experience" gained by a participant, as well as his decision-making behaviour.

The usually high involvement and enthusiasm of players has also been emphasised, as has been the fact that players receive a feedback to their decisions, and have to a certain extent to "live with" the consequences of those decisions.<sup>6</sup>

Since management games place the player in situations similar to those encountered in real business-life, and since they allow him to make a large number of decisions in a relatively short time-span, the purpose has been to use games as a means to speed up the experience-getting process. This approach rests on the assumption that the best way for training future decision-makers or to improve the decision-making capacity of actual managers is to provide them with experience. As noticed by Green, "Many games are justified by the apparently logical appeal that the practice of management is an effective means for developing managers"[24, p. 19]. As a consequence, game experience should be as similar as possible to real-life and thus, games should closely parallel reality. This approach was basically that of the first games designers.

As more games were designed, questions arose about their goals and their educational value. For example, Forrester[20] and Greer[24] argue that usual management games emphasise externals, short-term crises and intuitive and immediate decisions, rather than "the long-range planning of policies and organisations to avoid crises"



[20, p. 360]. Management games should not only teach the usual ways of making decisions, but above all, try to improve them.

Objectives of general management games have tended to become more precise and specific. The rather vague statements about getting business experience have been replaced by more detailed objectives such as: teaching the complex interrelationships that exist in an enterprise; trying to give an integrative view of the firm; helping players to become aware of the role of the behavioural and organisational factors<sup>7</sup>; giving them a feeling for the negotiation process, and making them more sensitive to the impact of competition<sup>8</sup>.

Herron's introduction to his Executive Action Simulation gives an idea of what can be done with management games:

"Among the important values of the simulation are:

- (1) It condenses a large amount of decision-making experience.
- (2) It integrates a knowledge of particular business functions . . . the importance of overall balance . . . is understood.
- (3) It makes clear the necessity . . . of reaching decisions with incomplete data.
- (4) It provides the experience of "role playing" in each of the different functional segments . . .
- (5) It . . . requires the participants to make a decision, see the effects of that decision and live with those effects . . .
- (6) It makes experimentation possible. It is always possible to return to a previous point . . .
- (7) It directs attention to the importance of determining the significant factors . . . and relating these properly to long range planning.
- (8) The participants become personally "involved" in a realistic situation . . ."<sup>9</sup>

This tendency toward a more precise and cautious definition of the objectives of gaming still relies on the assumption that the benefits one could get from it is highly dependent on the degree of similitude between the game and reality. Talking about their objectives when designing the Carnegie Tech Management Game, Dill and Doppelt report: "Because real executives deal with a complex rather than a simple world, we wanted a game that provided a richer and more complicated challenge than other games posed".[17, p. 31]. Such a statement underlines the general management games designer's tendency towards more complexity.<sup>10</sup>

Universities have been a primary user of management games, and since the introduction in 1957 of a game at the University of Washington,<sup>11</sup> more and more business schools have included games in their curricula. In 1968 a study by Dale and Klasson reported that by that date, games were used in two-thirds of the major schools of business[15]. In universities, games have been utilised for student education, but also in executive development programmes.

A number of business firms have also developed general management games, and used them as in-domo training devices<sup>12</sup>. Games similar to those used by universities have been utilised with the same purposes in mind. But companies have also built games with a somewhat different point of view. The game is then a (more or less successful) simulation of the firm's actual environment and operations, and the objective is not so much to improve the general decision-making abilities of the participants, but rather to improve their understanding of and their ability to cope with a situation particular to the company.

#### (B) Developing Specific Abilities

Some game designers have adopted a somewhat different approach to the objective of improving decision-making capabilities. Instead of relying solely on experience and its associated benefits, they have tried to improve more specific aspects of decision-making which they feel are crucial to good management and not properly tackled by the traditional approach to gaming.

Developing analytical and modelling abilities has been the most frequent objective of these games.

Greer's statement is typical of this approach:

"... a brief examination of human abilities casts considerable doubt on the proposition that experience alone leads managers to approach the potential limits of their organisational effectiveness"[24, p. 14-15].

"What seems to be required is experience, but of a very special sort. The developing manager must practise the art of determining system structure from the observation and analysis of behaviour . . . under conditions which permit verification in an ultimate sense . . . he must develop the ability to integrate his perceptions . . . into a meaningful, veritable model of his system . . . he must learn and practise the techniques for testing strategies in his model"[24, p. 15].

The game is usually a general management one. The model is the "world to be discovered" by the participants. Each player's task is to try to identify the relevant factors, their interrelationships, and then build his own model of the situation. Indeed, to the extent that players make decisions and receive feedback on these, they can estimate the impact of their decisions on the system under study and so, get some feeling for its behaviour. Games are well suited to this approach. Since they allow a great number of plays in a short time-span, the information on the outcomes of decisions, necessary to analyse the system, can be provided much faster than in practice. Also, games allow for some kind of experimentation with the system, which is clearly not possible in the real-world. Finally, the fact that the world is known to the instructor provides a unique opportunity for evaluating the quality of the analytical and modelling effort.

### (C) Teaching Functional Knowledge and Techniques

While general management games were designed for developing the perception of business problems and improving decision-making, functional games, were mostly used to teach certain techniques, or familiarise the player with some specific functional knowledge. Participants have to make rather detailed decisions in one functional area, the other areas being absent or only briefly outlined. The aspect of interaction between teams is generally less important than in general management games.

Functional games have been used as a support for teaching in specific areas. Games can help to illustrate important concepts and emphasise factors that usually interact in problems encountered in these areas. The instructor will seize this opportunity to indicate possible or usual ways of solving those problems.

Pushing that last idea further, a number of functional games have focused on very specific functional problems, the player's role being to find the most effective or the more efficient way for solving them. Alternatively, these problems have served as field material for applying certain techniques as inventory control models. Here, the idea is no longer to learn from the game, but merely to use it as a support for other teaching methods or as a way to illustrate them. Inventory management, production scheduling, computer processing, manpower management, allocation of advertising expenditures between different media, are examples of areas studied by this approach<sup>13</sup>. Specific games may also be used to familiarise people with new or modified procedures to be introduced in a company. In this case games are a good help to lower resistance to change.

Marketing games usually form a special case of functional games. They tend to be more complex than most other functional games and to consider top-management decisions rather than middle management. The goals that Day set forth for his game are typical of those of most marketing games: "The business game provides a dynamic environment for decision-making, allowing the student to see more clearly the meaning and relevance of knowledge he has gained from other kinds of study. While educational simulations involve many simplifications which keep them from fully duplicating the circumstances facing actual managers, they capture much of the essence of real business situations and provide valuable practice in making managerial decisions" [16, p. 1].

The double objective is clear:

- (a) to provide an illustration for the knowledge already acquired, and
- (b) provide some decision-making experience.

Thus this kind of game seems to be half-way between general games and functional games.

In functional games, the tendency toward more complexity has been far less important. This is certainly due to the fact that there is no real point in making games more realistic, since they are only intended to illustrate specific teachings or to support the teaching of particular techniques.



Nevertheless, there are exceptions worth noting, especially in the marketing field. The best known example is Amstutz's Computer Simulation of Competitive Market Response[4] which looks more like a general management game than a functional one.

**(D) Some Neglected Ways?**

Many ways of using games have been proposed. As we have seen above, some of them have been widely adopted. In contrast, others have not known a very widespread use, despite their alleged advantages.

Whereas in war games, both rigid play and free play games have been widely used, rigid play games have been by far the most common form of management games while free play games have been almost non-existent.

This may be partially due to the heavy use of computers for scoring management games. Although the computerisation of a game is a long and costly process, this disadvantage is most often more than made up for by the easiness and the usually lower cost of scoring as well as by the quickness and accuracy of operation.

The computer has also made it possible to run rather complex games at a reasonably low cost, which was almost impossible for manually scored games. This tendency to use computers has certainly been accentuated by the prestige associated either with constructing or with playing a computerised game.

Up to now, the trend has been to try to take advantage of the performances of computers to integrate more and more elements in games<sup>14</sup>.

Some authors, nevertheless, have felt that a part of the potential of gaming was untapped because of the focus on rigid games. One of the most serious criticisms that has been made of rigid games is that they put too much emphasis on the quantitative aspects of the situation—which are easier to put into computer form—and that they do not allow much creativity. Indeed the problem-finding process, as well as the alternatives-generating process are greatly reduced, since the players have only the opportunity to make a fixed number of decisions on specified problems.

To avoid these drawbacks, a number of authors have tried to introduce qualitative elements in games, and to provide for some flexibility during the play. In this respect the Carnegie Tech Management Game is one of the first games in which non-rigid elements have been introduced.

Cohen and Rhenman have proposed the concept of "business game case" which "essentially involves a relaxation of the requirements that all the rules of the game and the whole environment be specified in a complete computer program and that all the rules of the game be presented to the players at the start of the game"[13, p. 155].

They go on to suggest a number of features that could be introduced into games: more realism in the financial aspects, in manpower management, public relations, R & D, . . .

An example of what can be done to combine advantages of rigid and free games is given by the "Exercice de gestion d'entreprise" developed by Dister[18].

At the start of the play, this game looks like any rigid general management game, with a number of well defined rules and specific decisions to be made, but other points are only outlines. As the play goes on, new elements, that influence the decisions to be taken, are introduced, and opportunities for non-specified decisions exist.

For example, if the management does not pay attention to its labour force (let us say by neglecting to "adapt" wages, or by having a policy of frequent hirings and firings), it will be told that its workers have gone on strike, and that it cannot produce anything until the problem is settled. Then the players will have to get involved in a negotiating process with the "trade unions" (whose role is assumed by an administrator).

As for the decisions, they are of three kinds:

- specified and compulsory, such as decisions regarding the number of units to be produced, the quantities to be sold in each market, the prices of the products, the level of the advertising expenditures, etc. . . . These decisions are to be made each period.
- specified but optional such as decision to borrow, to ask for an increase of capital, to order new plant, machines or warehouses. These decisions are present on the decision sheet, but do not have to be taken each period.
- non-specified and optional. These concern the decision to buy information, the kind of information that is to be bought, for what period of time . . . , the decision to buy (or sell) products or machines from (to) competitors, or even the decision to merge two firms.

This game shows that it is possible to introduce some non-structured elements into a rigid game. It may be worth noting that until recently this game was manually scored. This may explain why it tends to be less rigid than most games on the market. When the game has been computerised, particular attention has been paid to the preservation of its flexibility.

Finally, let us remark that introducing "free" elements in a game does not imply give up the advantages of rigid play, and specially computer scoring. The game administrator may handle qualitative and non-structured problems, and so, be some kind of interface between teams and the game model.

The concept of programmed play has been proposed by Meier as another way of using games for teaching[37 and 38, pp. 199-203]. Instead of making a number of specific decisions at each period, the teams would be required to formulate a strategy at the start of the game. This strategy is run through the computer which generates for each period the specific decisions. The player can try out several strategies, and evaluate the effects of each of them.

The educational value of this approach is that it emphasises long-range strategy, rather than period-to-period decisions. Thus, it avoids the emphasis of most business games on short-term crisis and immediate decisions so much criticised by Forrester<sup>15</sup>.

Programmed play has been applied in some non-interactive functional games. In a

financial game, for example, it is possible to use the concept of programmed play to show the impact of the firm's financial structure of different financing policies.

Finally, one additional use of games as a training and teaching device should be mentioned.

In the Carnegie Tech Management Game, students have been associated in building parts of the model. This makes it necessary for those students to gain a good understanding of the area they want to simulate. This procedure also gives them the opportunity to become sensitive to problems associated with model building.

Using students as game supervisors can also prove useful, for this task requires them to gain some mastery over the field covered by, and the problems occurring during, the game. It also allows them to look with some perspective at how decisions are taken and what group phenomena take place.

#### HOW USEFUL ARE BUSINESS GAMES AS LEARNING AIDS?

From the first games that flourished right after the AMA game, the value of gaming as a teaching and training device has been questioned and attention has been drawn to certain of its weaknesses and pitfalls.<sup>16</sup>

At the same time, a number of research studies have been made to try to assess experimentally the impact of games on learning. Before describing these evaluation efforts, we will briefly discuss the significance and the importance of the evaluation issue.

The reason why it is important to evaluate management games is that costs are associated with their use, and that these are far from trivial.<sup>17</sup> The costs are of two kinds: design and implementation costs, and operating costs.

Design and implementation costs include the designers' time and the programming and computer costs. The time required by the construction of even a rather simple game may be quite long; besides the design itself, the debugging phase and the numerous trial-and-error exercises (for parameters setting for example) needed to get the desired behaviour from the game are quite time consuming.

As to the operating costs, they consist of the instructor's time, supplies, documentation, computer runs, and, last but not least, the opportunity cost involved in having people playing the game instead of using alternative educational methods.

#### What Does Research Say?

In 1962, McKenney undertook a study in which he tried to measure the effectiveness of business games compared to that of the case method[35]. In production management courses, a number of students played a game while another group discussed integrative cases; the objective of the courses was to study a number of concepts in planning. The results from written examinations showed that the group which had played the game had higher scores than the case group, and McKenney concluded that the time devoted to games instead of cases was worthwhile.



In 1963, Dill and Doppelt proposed an evaluation of the educational value of games, based both on their experience with the Carnegie Tech Management Game and on information collected by questionnaires[17]. Learning mainly occurred in the way of playing the game more effectively (selection, co-ordination, and use of information, analysis of model and competitors' moves, links between decisions and results). A more general form of learning also appeared (relevance of certain economic concepts, utility and limit of quantitative decision rules, importance of behavioural and organisational factors for team work). This second kind of learning resulted in an awareness that certain managerial problems exist, rather than in a knowledge of how to deal with them. Students' answers emphasised the predominance of interpersonal learning (i.e. learning coming from interactions with members of the group or with outside groups—as the board of directors). Learning from the interaction with the game itself (i.e. trying to understand the model, the impact of decisions, . . .) was considered as less important.

#### Does Participation Aid Learning?

An interesting observation was that the game had been an incentive to work in other courses and had helped to give a deeper understanding of certain subjects. Students were motivated to study certain matters that could help them in the game and, conversely, the use of these matters in the game made them better understood. This is, in our opinion, one of the most important findings of this study. Finally student interest and motivation was shown to depend upon the initial interest they had in playing the game, the team's performance, and the challenging character of the job the individual was assigned to.

Research conducted by Raia[45] compared the impact on students' performance and interest of: case studies plus a simple game, case studies plus a complex game and case studies plus readings. No significant difference was observed between groups in their ability to analyse cases, but both game playing groups scored higher on final examinations than the readings group.

This can be related to McKenney's finding that game-playing groups did better than cases groups in the final examination, and suggest the more general conclusion that it may be worthwhile to transfer sometimes from more traditional methods to games.

The hypothesis proposed by Raia that "participation in management games provides better understanding of basic concepts and techniques and improves ability to apply them to specific situations"[45, p. 346] may seem somewhat in contradiction with the Dill and Doppelt observation that students became aware of important managerial problems, but did not learn much about general or specific ways of dealing with them. A possible answer may be that, although the acquisition of knowledge of how to solve problems is not that important in games, they are nevertheless superior to the other teaching methods in that respect.

Participation in games did not foster more favourable attitudes toward the course than the readings did, but it heightened interest and motivation.

The most interesting finding was that no significant difference was observed on any point (performance, attitude towards course, interest and motivation) between the group playing the simple game and the group playing the complex one. Raia says, *"the evidence clearly indicates that the simple game provided essentially the same learning benefits as the one that was relatively more complex and suggests that learning experience is not directly proportional to the degree of complexity of the simulated environment"*. [45, p. 346]

This brings up the issue of realism and complexity of games. We fully agree with Shubik when he says that "realism in gaming is often a false issue. Any simulated environment is obviously an abstraction of the actuality; the problem faced in game construction is not how much a simulated Widget looks like a real Widget, but what difference does it make for the purposes at hand". [50, p. 634].

The last sentence should be emphasised. Realism in itself is not a desirable feature, and should only be introduced in a game if it is necessary to meet the game objectives. Adding realism means adding complexity, which in turn means increased costs and difficulties of administration. Moreover, as games become more and more complex, it becomes increasingly difficult for participants to understand what is going on and to have an overall view of the game situation. Thus complex games are the most likely to foster decisions focused on short-term crises denounced by Forrester<sup>18</sup>. Learning is slow, and details may darken what was to be shown by the game.

We do not advocate that all games should be simple ones (we personally use a fairly complex game in our managers' training programmes), but we want to emphasise that realism is costly, both in monetary and educational terms, without necessarily adding to effectiveness.

### How Valid is the Research?

The studies discussed above tend to indicate that gaming is a useful tool for managerial teaching and training. However, in a recent review of the empirical evidence on the effectiveness of games as a teaching and training device, Schriesheim [48] advocates that this evidence must be considered inconclusive.

In his study, Schriesheim identifies what he calls "the ten most common claims about what business games teach or foster" [48, p. 1] and tries to see if these claims are validated or not by the empirical evidence. The results of this review can best be summarised by Table I.

Though the review made in the Schriesheim paper plays down some of the positive evidence, it illustrates the fact that the educational effectiveness of business games is not yet a scientifically proven fact. Secondly, it clearly points out the difficulty of measuring the teaching results of games, and the pitfalls of the methods which have been used to evaluate them. Schriesheim proposes four factors which contribute most to make the studies inconclusive.

**Table I. Learning from Business Games: Summary of Empirical Results of Research (N = 12)**

| Claim   | Number of Studies with Findings that were |              |          |
|---|---|--------------|----------|
|   | Positive                                  | Non-positive | Negative |
| Decision-making skills                            | 0   | 2            | 0        |
| Planning and forecasting skills                   | 1   | 0            | 0        |
| Recognition of the interrelationships in business | 1   | 3            | 1        |
| High participant interest and motivation          | 2   | 1            | 1        |
| Knowledge of facts and use of specific techniques | 1   | 5            | 1        |
| Interpersonal skills                              | 1   | 2            | 0        |
| Bearing of the consequences of decisions          | 0   | 0            | 0        |
| Organising ability                                | 0   | 2            | 0        |
| Communications skills                             | 0   | 0            | 0        |
| Acceptance of the computer                        | 0   | 0            | 0        |

Note: The full claims are that business games teach or foster each of the areas listed above.

Source: Schriesheim, C. A., *Business Simulation Games*[48], p. 15.

(1) Great differences exist in the games which have been evaluated. They vary greatly in complexity and are designed for different purposes and have different structural, content, and administrative characteristics.

(2) The administration of games is not standardised. The degree of coaching and follow-up discussion allowed during play varies greatly, and probably greatly affects research results.

(3) Game structure and the learning objectives of games are often not clearly related. The education ends sought must be clearly specified in research is to fairly evaluate effectiveness.

(Indeed, in many of the studies, there does not seem to exist a close link between the characteristics and objectives of the game and what has been measured).

(4) Most of the research on games is of the single study variety[48, p. 6].

As a fifth point, we could add the inadequacies of the evaluation methods which have been used in some of the surveyed studies. For example, using in-basket exercises to evaluate the results of a business game does not seem to us a very adequate method.



Besides the evidence (or relative lack of it) based on empirical studies, there exists a large body of support for the effectiveness of games, coming from educators' experience with gaming. In a second study, Schriesheim and Schriesheim[49] examine evidence provided by expert opinion. Using the same ten claims categories, they make a content analysis of the non-empirical evidence reported in the literature. According to that study, four claims appear to be largely supported by expert opinion. The claim most generally supported is the claim that games induce high interest and motivation of the participants, followed by the recognition of interrelationships, decision-making skills and planning and forecasting skills. The six other claims receive less support.

Although the question of a systematic validation of business gaming as a teaching and training method remains open and may ask for more research, as suggested by Schriesheim and Schriesheim, it does not appear to us as the most important problem to be dealt with. We personally feel that evidence coming from the experience of educators who have used games for more than fifteen years is convincing enough to accept the claim that games can teach things. The real question is to know what they can teach better or faster than alternative methods, what are the characteristics of a game which foster a particular kind of learning, and under which conditions<sup>10</sup>.

#### **How Can We Assess The Value of Business Games?**

According to our experience, two issues determine fundamentally the value of a game (leaving apart participants' personal characteristics and motivations):

- the links between design and objectives;
- the teaching environment in which the game is used.

The design issue and its links with objectives is of the utmost importance. In that respect, Cohen and Rhenman have proposed "some hypotheses about the relations between the design and administrative characteristics of business games and their educational properties"[13, pp. 145-152]. These hypotheses may serve as an interesting starting point for reflection and for further studies. Generally speaking, not enough attention has been paid to that problem. It should be clear that what can be taught with a game depends largely on the characteristics of that game. This means that a game can only meet its objectives if these objectives serve as a basis for the design. The kind of game, its scope, the periodicity of decisions, the elements that are or are not incorporated should be determined by reference to the purposes of its use. Different objectives lead to different types of games, which in turn imply different resources. Too many people, up to now, have failed to recognise that necessary link between objectives and design. We fully agree with Greer when he says that "it seems probable that no single answer exists, but rather, that games can validly be used for several purposes. What may be paramount is that the user knows what he is trying to teach and that he uses a game which is valid for this purpose"[24, p. 20].

Even a properly designed game cannot be used alone, i.e. isolated from other teaching methods. A game is a means of teaching a certain number of concepts, skills

or techniques, but it cannot do the job alone; gaming does not replace all the other forms of teaching and training. We think the full potential of games can only be reached if these are integrated in a larger teaching environment: frequent debriefing sessions, lectures related to problems encountered in the game . . . The concepts of functional integration and the necessity of planning are better understood if the game is included in, or related to, a course in business strategy. Problems of collection, selection, organisation and analysis of information are better perceived if a course in Management Information Systems is associated with the game. In turn, practical implications of MIS courses become much clearer. Debriefing sessions are also very important, in that they try to pinpoint what has been observed or learned, and to formalise the knowledge that has been gained. This requires an unremitting and energy consuming attention from instructors.

If it satisfies these two conditions (which are not trivial), a game can be a very nice tool to teach a number of problems, concepts or skills in a situation which is closer to reality than in any other teaching method. To paraphrase a well-known advertising slogan, we could say that, "Gaming is the next best thing to doing it".

Games can easily be considered by players as a true picture of reality. As a consequence, participants tend to expect the observations made during games to hold for real situations. Thus some danger exists that a design error or game idiosyncrasy be accepted as an expression of reality and incorporated as such in the participants' image of real-world. Particular attention should be paid to this problem, specially during the debriefing session.

## MANAGEMENT GAMES AS A RESEARCH DEVICE

Although the use of business games for research purposes has considerably increased during the last few years, important work remains to be done in this field. As we will see, the research opportunities offered by management games are far from being exhausted.

We have grouped the different studies according to the kind of problems researchers of business games investigate. It should be realised that this distinction is somewhat artificial, and that many research studies may overlap on several categories.

### (A) Behavioural Studies

From their very nature, management games form an ideal tool to study behavioural problems. They place individuals in a situation comparable to real business life in most respects. Participants bring with them their different experiences, specific background, and own aspirations. They have to interact and fit together so as to manage a simulated company. The problems they face during this process closely correspond to those faced by the members of a management team.

Therefore business games seem to provide the researcher with an excellent environment to study behavioural questions. As the situations that occur during the play are to some extent under control of the experimenter, he is able to study the impact of certain variables (such as business experience, market structure, some psychological or sociological attributes on the participants, etc.) on the participants' behaviour either as individuals or as a group.

The interest in the use of business games as a research device in the behavioural field rests on the fact that some studies have shown how gaming behaviour is similar to actual business behaviour. Babb, Leslie, and Van Slyke[5, p. 469] for instance, found that game and real life behaviour of participants were consistent. They also reported that the game policies were comparable with those of real life<sup>20</sup>.

A very interesting research study has been undertaken by Lewin and Weber[34]. They studied the change appearing in the risk-taking attitude of individuals and teams during the play of a complex business game. They measured the risk-taking preference<sup>21</sup> twice, first at the very start when the teams were formed and again after the participants had played the game. This allowed Lewin and Weber to appreciate the evolution of risk-taking preference over time. This study reported that at the end of the game, "the teams showed a greater preference for risk taking than when they were first formed. This was true both for individuals and for teams and groups"[34, p. 49].

Some aspects of the formation and evolution of objectives have been reported in a research conducted by Bass[8]. This author found some evidence that managers and wage earners develop different objectives according to the specific organisation to which they belong in the game. He also noticed that at the end of the game, goals did or did not become clearer according to the organisation in which they were formulated and developed. We will have the opportunity to discuss this research in more detail later. Nevertheless, it is worthwhile to mention it now as a first step in the study of objectives formation within the framework of a management game. It is no conjecture to say that the problem will receive more attention in future studies. We think for instance of the evolution of managers' objectives over time which could be studied in the game context.

The above review of the literature gives some idea of the small number of behavioural problems which have been investigated using business games. But as we have already said, a lot of work remains to be done. During the next few years, research will probably be undertaken on questions such as: the influence of team size and composition on participants' level of involvement and the team decisions; the impact of some individual characteristics like the participants' level of aspiration or need for leadership on the team decision-making process; the factors which favour the appearance of changing behaviour over periods and the specific areas in which such changes occur; individual and team goals formation, . . .



**(B) Role of Information; Individual and Group Decision-Making**

Games have been utilised as laboratories to investigate the individual and group decision-making processes. Research has also been undertaken to study the information system of the decision maker. Questions such as (1) given a certain decision, what is the relevant information, (2) how do people analyse the information they receive, (3) do decision makers use the available information, (4) how does the availability of information improve the decision-making process and the decision itself, etc. . . . , have been raised. Some of these questions have been studied, others are being investigated.

As reported by Babb and Eisgruber[6], an interesting research was made by Leslie [31]. The latter was interested in identifying the different types of information the participants used to make decisions, and in evaluating management games as an environment to study the role of information in decision-making. The results of this study showed that a very developed information system is not a panacea, and that good management is the most important element. It was also found that some kinds of information which appeared to have an impact on profits were asked for and used by participants although this information was not available in their actual companies. Such a finding emphasises the benefits that could be gained from using management games to study and improve the manager's information system.

Philippatos and Moscato[42] have studied the influence of information availability and other factors on the decisions taken by three teams involved in a functional game. They observed that "the participants in all three groups were able to discern the important variables in the game and make decisions that assured viability to their firms. Moreover, the results . . . [supported] . . . that there is no discernible significant difference in the decisions of the groups that were segregated into specialists and non-specialists as well as informed and uninformed"[42, p. 347].

In another empirical study, the same authors[43] have drawn a similar conclusion. Nevertheless, the lack of a reliable criterion to measure "how good" decisions were in an absolute sense (rather than on a relative basis, by comparison with other firms) did not allow them to be more precise about the meaning of "decisions that assure the viability of their firms". These two studies seem limited also if we consider the fact that they only studied the role of "qualitative" information concerning the nature and rules of the game. From a business point of view it would have been highly interesting to complement their findings by an investigation of the effect on current decisions of different levels of "quantitative" information (as resulting from previous decisions).

Such a study is currently undertaken by Meurs[40, 41]. He designed a functional business game in order to investigate the impact of different levels of quantitative information on decision-making. The game structure has been chosen so that it is possible to derive for each period the optimum set of decisions for a given firm. The existence of such an optimality criterion allows one to observe the evolution in the teams' performance over periods, and to study dynamically the impact of information

availability on that performance. A quantitative study is carried out by devising measures of effectiveness in the use of information and measures of understanding of the game situation. The quality of decision-making and its variation over time, the importance and the rapidity of learning about the game situation, as well as the impact on decision-making of information availability and formal model availability, are investigated in the research.

To study the role of formal models in decision making, a study undertaken recently at MIT by Marcotte[39] takes advantage of the fact that in the MIT game firms compete on two markets (domestic and foreign) which have exactly the same structure but different parameters values. The players are not told about the similarity in market structures. On the foreign side, firms have at their disposal an on-line market model which is a perfect simulation of the market; the use of this simulator is prohibited on the domestic market by a check on the decision variables (the range of the decision variables values is different from one market to the other). This design makes it possible to study the role of a formal model in decision-making, by comparing the model-aided situation (or rather model-available situation), with the non-model-aided situation.

Another study of interest is the one by Fife[19]. As reported by Babb, Leslie and Van Slyke, Fife used a complex management game to study the "process and methods by which twenty-one actual management teams from plants in the Midwest made decisions"[5, p. 470]. It was surprising to see that some teams became aware of mis-functioning in their own decision-making behaviour as revealed in the game and planned changes to improve it upon return to their own company.

In a rather comprehensive study, Wolf[60], using different versions of a moderately complex game, had groups competing with an artificial player. His major research objective was to investigate the impact of different environments on decision-making. In a first experiment, he found that "a general expertise or lack of it does not affect decision-making in the game"[60, p. 110], a finding similar to that reported by Philippatos and Moscato. He also found that decisions largely varied among individuals, an observation that has also been made by Greer (see below). The competitive behaviour of players appeared to be influenced by the degree of aggressiveness of the artificial player.

The second experiments confirmed those findings, and also "told us that people do not perform to near optimality immediately or eventually, even though they do as well or better than the artificial player"[60, p. 111], which is also close to one of Greer's findings[24, Chap. 5]. A third experiment revealed that "the fewer the decisions, the faster and better the learning, and the better the information from the environment, the better the learning"[60, p. 111 and 112].

Although its main concern was with the teaching potential of business gaming, Greer's research[24] has yielded a number of interesting findings in the field of decision-making. Using a medium complexity management game, he asked different groups (students in Industrial Dynamics) to try to understand the game, its structure, and the

parameters values. At the end of a first series of plays, groups were asked to build a model of the game; then, they played it again for a few periods.

Greer found that most teams had a good perception of the game structure and parameters, and that they were rather good at modelling. He also made two interesting observations on the decision performance of the teams:

- First, decisions were not very good, and the variance between results of different groups was large.
- Second, the modelling activity did not improve the decision-making quality nor did it modify the firms' relative performance (i.e. the "good" firms remained "good", and the bad firms remained "bad").

#### (C) Organisational Studies

As management games generally simulate the major functions of an enterprise and necessitate group decision-making, they create organisational problems very similar to those appearing in real life. That is the reason why in the last few years, some researchers have used business games as an experimental laboratory in which to study problems related to organisations.

This tendency is fostered by the difficulty that organisational researchers have in investigating problems arising in real organisations. The method which consists in observing and interviewing organisation members to study the environment in which they worked has failed in many cases. Persons interviewed are for instance unable to remember with precision all the facts which are related with the organisational problem under study. They are also inclined to perceive and interpret the situation in their own way. As a result, objective data concerning organisational question are very difficult to get and the researcher can hardly identify the variables which really interact and characterise the situation under study.

On the contrary, management games allow the researcher to study more objectively the organisational situation in which he is interested. He can design a new game or adapt an old one so as to control the situation in some way. So, he is able to study those specific facets of the problem which most interest him.

Moreover, management games do not only allow the researcher to study organisational problems in a static context, as case studies did. They make it possible to investigate the evolution of those problems over periods and so, to study the dynamics of organisations.

Cangelosi and Dill, for example, have conducted a study in the field of organisational learning[10]. Using as a research support the Carnegie Tech Management Game, they focused on a single team of seven graduate students who played for a semester. The authors identified four stages in the team's organisational development. In the initial phase, the group mainly tried to get acquainted with the game. Then came a searching phase, characterised by a search for successful decisions, and the appearance of decisions intended to cover more than a period. In a comprehending phase, learning became important, and the participants began to use analytic concepts



and techniques. At the end of the game, in a consolidating phase, the team became more confident, and it was possible to routinise many decisions. Cangelosi and Dill observed changes in goal structure, in the variables used to make decisions, and in the decision-making process. They noticed that "the observations were successful in demonstrating that the organisation did learn, but were much less successful in showing how it learned" [10, p. 190]. They compared their observations with three other studies of organisational learning<sup>22</sup>, and proposed a synthesis of organisational learning theories.

The main problem resulting from the use of management games as an organisational laboratory is to make small groups situations as similar as possible to real life complex organisational situations. If, for example, the groups' size seems too small to provide a relevant context for the problems of interest, the researcher may control some variables and especially the structure of the communication network so as to increase the difficulty of communication between game participants. The objective is to reduce the "interaction potential"<sup>23</sup> of the players. The researcher will for instance restrict face to face communication, which will constrain any information to pass through different organisational levels of the simulated company<sup>24</sup>.

Bass[8] hypothesised that executives could find an answer to the question of knowing whether their organisation should be modified to improve its overall operations, by games specially designed for this purpose. He used an organisation simulation. In a first experiment, he found out that the group of participants which formed a simple line-staff organisation was more effective than the other group which duplicated the more complex line-staff arrangement of its own real life company.

In the second experiment Bass conducted, "one of the competitors was given explicit directives to operate by means of individual decision-making and responsibility, while the other was forced to adopt committee decision-making as the basis of its organisational life" [8, p. 550]. The committee organisation was found to be more effective and flexible. In addition, the line-staff organisation was confronted with important labour difficulties.

In a third study, different groups were asked to operate a simple, complex and overlapping committee organisation. It was interesting to notice that during this experiment "the simple organisation, despite instructions not to do so, actually made considerable use, much more than the complex company, of decisions by committee" [8, p. 552]. On the contrary, large efforts were made by some players to transform the overlapping committee organisation into a more traditional line-staff one. Such observations raised the problem of participants' resistance to change and allowed Bass to draw some considerations about the introduction of change in organisations.

Both the study of Cangelosi and Dill and that of Bass give a good idea of how management games have been used in the organisational field. A lot of work remains to be done in this area to check the results already obtained, so as to get a sufficient basis for generalisation. Research should also be done in a more exploratory prospect to develop and test new types of organisation structure and/or to compare organisation modes between them.

#### (D) Oligopoly Market Behaviour

Few studies have taken advantage of the fact that games can be good representations of oligopolistic markets to study oligopoly behaviour. Indeed, in a typical business game, a small number of firms compete against each other on a market (or on several), and players are generally well aware of the impact of their competitors' actions on their own firm's performance. Games may be very useful to study a phenomenon such as oligopoly.

Hoggatt[27] seems to have been the first one to use a game to explore the interactions of firms competing in an oligopolistic situation.

Symonds[55] developed a general model allowing him to generate a series of games to study different oligopolistic situations. He was primarily interested in identifying the characteristics of competition which most influence the decision-making behaviour. He also wanted to investigate the aggressiveness of competitive behaviour as well as the possible appearance of collusion.

An interesting relationship appeared in the labour market—where the firms were competing for manpower—in that the importance of the aggressive behaviour of a firm was found to depend on the strength of the industry aggressiveness. The experiment also showed that the variations over time in the strength of the firm's aggressive behaviour produced cycles of inflation and deflation while limitations on competitive aggressiveness resulted in much milder cycles.

Pifer[44] has used gaming to determine whether the assumption of economic theory that the objective of the firm (e.g. profitability) is synonymous with the operational strategy employed (e.g. maximisation of profits), is valid within an oligopoly market. His results tend to confirm his hypothesis that "maximisation of *ex ante* profits within an oligopolistic market may *not* result in the maximisation of *ex post* profitability" [44, p. 161], and that the assumption of economic theory may well not be valid.

Stern[53] has also worked in this field and has been interested in testing a number of hypotheses of the oligopoly theory. Fouraker, Shubik, and Siegel[21] have done similar researches. More recently, Shubik, Wolf and Eisenberg[51, 52] have carried out a number of experiments using the Shubik-Levitan game[32, 33], and Hoggatt has gone on with his previous work by using a simple game model to study competition [28].

To put it in a few words, research on oligopoly that has been conducted within a game framework has tried (1) to assess the impact of different oligopolistic situations on decisions made by the firms, (2) to understand how certain behaviours specific to oligopolistic situations do emerge and develop, (3) to discover how certain oligopolistic phenomena can be influenced.

### (E) Operational Gaming

Thomas and Deemer have defined operational gaming as "the serious use of playing as a primary device to formulate a game, to solve a game, or to impart something of the solution of a game"[57, p. 6]. Operational gaming is thus very close to game theory, and relies on the assumption that repeated plays (i.e. repeated trials-and-errors) may yield optimal solutions or strategies for games, when analytical tools are not powerful enough to reach such solutions. But as we move toward multiperson interactive games, we lack a reliable and unique criterion for evaluating strategies and their outcomes. As for the application of the operational gaming concept to the business environment, Cohen and Rhenman[13] think such uses are possible, but they identify conditions that have to be met ("make the structure simulated . . . sufficiently realistic and . . . participants . . . sufficiently well aware of good business practice to behave in a reasonably intelligent manner"[13, pp. 159-160]) and difficulties that have to be overcome (*robabilistic difficulties*, i.e. difficulties due to the fact that the random elements of a game affect in a significant manner the result of the strategies, and *strategic difficulties*, i.e. difficulties that arise because the outcomes of a group's strategy are highly dependent on its competitors' actions) before operational gaming can be successfully applied to business problems.

When we consider these problems and difficulties, it is not surprising that Cohen and Rhenman noticed in 1961: "to our knowledge, nobody has as yet attempted to use an existing management game to discover optimal patterns of business behaviour"[13, p. 159]. We could make today a similar remark.

### (F) Evaluation

The research studies we have discussed above show that management games provide a unique environment to study various aspects of individual and group behaviour, decision-making, information utility, organisations and oligopolistic situations.

In the real world, each of these questions is characterised by the fact that many uncontrollable factors interact, making it difficult to identify exactly what caused what. In contrast, the game "world" is known to the researcher. He can vary its complexity and exclude non-relevant interferences, according to his specific goals. An appropriate design will also provide for good measurability of the variables of interest.

But gaming is an expensive, time- and energy-consuming process which cannot be utilised to study all management problems. More research is needed to delimit its potential in the field.

Here again, it is of utmost importance that research objectives and design be closely related. By design, we mean not only the game design, but we think of the whole research design, including the methodology. In this respect, a real conflict may appear when games primarily conceived for education are used to investigate certain questions. Nevertheless, because of the costs involved in games design and development, some authors have proposed to develop games that would be suitable both for teaching and



research. Despite the difficulties, we think that it should be possible to develop such games, and even to use for research purposes games originally built for teaching, provided that teaching and research are not carried out at the same time. Indeed what seems to be paramount is that teaching and research have incompatible needs in how a game should be administered. It is this conflict between teaching and research requirements which may lead to an improper research environment and consequently reduce both the educational impact and the validity of the research results.

In addition, the danger exists that observed behaviour in fact comes from game idiosyncrasies. For these reasons, the greatest care is always required during the interpretation and analysis phases.

Let us now concentrate on the generalisation of findings. It is no conjecture to say that, as in any research, bias resulting from the problem situation and subjects under study will affect the results in studies using games. Nevertheless, no evidence exists that these biases are more important in such studies. Moreover, they certainly do not outbalance the numerous advantages of this research method.

It can also be argued that the game situation is sometimes rather close to a laboratory situation, and that it may be more relevant to study problems in a more complex, richer situation. We will say that a mere distinction between "real-world situations" and "laboratory situations" is a bit simple-minded. It is certainly more correct to say that the reality is made of many kinds of situations (both real-world and laboratory), and that what we need is converging experiments with different types of situations and different types of subjects. By comparing the results of these experiments, it will then be possible to discriminate between what is generalisable and what is due only to the specific research context.

## SUMMARY

- Based on the experience gained in war games, on the development of operations research and on the availability of high speed computers, business games appeared as an answer to a demand for new methods of training managers and business students.
- Their primary objective was to improve participants' decision-making by providing them with experience similar to real business experience, much faster than could be done in real-life. Consequently, games tended to become more and more complex, in an effort to closely parallel reality.
- As experience with games built up, the operationally vague objective of "improving decision-making" was gradually replaced by more precise and specific objectives like: giving participants an overall view of an enterprise, making them more sensitive to behavioural and organisational factors, . . .
- Besides general games, two other kinds of games have also appeared. Rather than relying solely on experience and its associated benefits to improve the whole decision-making process, some games aim at improving specific aspects of it considered as crucial for good management. Their most frequent objectives are to develop analytical and modelling abilities.

Functional games aim at familiarising the player with a functional area (marketing, finance, production, . . .). They can be used as a support for teaching in specific areas or as an application field for certain techniques.

—Alternative ways of using games have been proposed which try to avoid certain drawbacks of most games or to take advantage of potentialities of games still unused.

Because they think that most games put too much emphasis on the quantitative aspects and do not allow for much initiative, some authors have tried to introduce qualitative elements in games, and to provide for some flexibility during the game.

The concept of programmed play emphasises long-range strategy, rather than period-to-period decisions. Instead of making specific decisions each period, the teams formulate a strategy which is used to generate the decisions for the whole game. The teams can try out and evaluate several strategies.

—Games are costly to develop and operate. For that reason, research work has been done to try to assess experimentally their impact on learning. A number of studies have been discussed and tend to indicate that games are useful teaching devices. On the other hand, a recent survey suggests that the empirical evidence on that question is inconclusive.

—However, evidence coming from educators' experience supports largely the contention that games are useful teaching and training devices, and suggests that the real question is not so much, "Can games teach things?"—they surely can—but rather "What can they teach best, and under what conditions?"

—We suggest that two elements mainly condition the effectiveness of games:

- (i) the link between objectives and design;
- (ii) the teaching environment in which the game is used.

—In recent years the use of games for research purposes has considerably increased. Because their characteristics and complexity can be varied to meet the research objectives, because the "world" is known to the researcher, because also of the replicability of the experiments, games provide a unique research environment.

—Since they place individuals who have to interact and fit together in a situation comparable to real business life, games provide an important tool to study behavioural problems, as well as decision-making.

—As management games generally simulate the major functions of an enterprise and ask for group decision-making, they create organisational problems very similar to those appearing in real life and so offer experimental situations in which to study those problems.

—Some studies have taken advantage of the fact that games can be good representations of oligopolistic markets to study oligopoly behaviour.

—Operational gaming has been proposed as a means to find optimal solutions for games in game theory, but severe problems exist.

—As in gaming for training purposes, particular attention should be paid to the links between the objectives and the research design.



## GENERAL PURPOSE GAMES

### (1) *Carnegie Tech Management Game*

The Carnegie Tech Management Game is a complex game which has been designed to present situations close to those faced by managers in the real-world. Many questions, ranging from functional problems to organisational problems, can be stressed in the game. A particular emphasis is placed on information selection and utilisation, since a very large amount of information is available to the players. Besides trying to develop general management ability, more or less emphasis can be put on one or another of the questions mentioned above.

Source: Cohen, K. J., and al., [12] and [14].

### (2) *Exercice de gestion d'entreprise*

In this game, three to five teams compete in an environment which is quite close to reality. Each team acts as the board of directors of a firm, has to organise its work and makes decisions in every functional area. The main characteristics of the game are its flexibility which allows for much initiative, and the fact that it is used within an especially tailored teaching environment. According to the needs, the emphasis can be placed on a variety of questions, economical as well as organisational. Special attention is paid to the transfer of knowledge from the courses and cases to the game, and over all, from the game to the participants' real situations.

Source: Dister, G.[18].

### (3) *General Electric Management Game (III)\**

This game emphasises judgement about competitors' actions and strategy making. The competitive aspects have much importance, and it is difficult to recover from a bad position. The objective of the game is to develop the capacity for making better plans.

Source: Newman, R. W., Consultant, Economic Division Models, Information Systems Service, General Electric Company, 570 Lexington Avenue, New York.

### (4) *Harvard Management Simulation Two*

In this complex game, teams from twelve to fourteen manage a company which produces from one to three consumer products and sells them through three channels of distribution in four different regions.

The information system available to each team is fairly important and computer-based.

\*These abstracts are summarised from Graham, R. G., and Gray, C. G.,[22]. Those interested in more detailed abstracts or an extended review of business games in use should refer to the source.



The objective is to allow players to organise themselves and their firm, to experiment with the concepts they have learned in their courses, and to get or improve an integrative view of general management.

Source: *Harvard Management Simulation Two*, Manual 1, Harvard Business School, Cambridge, Mass., February 1972, Rev. 2/73.

(5) *MIT Sloan School Management Game*

In this medium-complexity game, teams of four or five make decisions in marketing, production and finance, and compete on a domestic and foreign market. The objective of the game is to give an overall view of a firm and also to give the opportunity to use computer based decision support tools, including a simulation model and a multiple regression analysis package.

Source: *Sloan School Management Game*, Player's manual, Sloan School of Management, MIT, Cambridge Mass., 1972.

(6) *UCLA Executive Decision Game No. 2\**

In this game, participants are assumed to be top managers of a manufacturing firm. They organise themselves, and make decisions in every functional area. The game is quite complex, and the firm's environment is rather close to real business conditions. The game aims at providing participants with experience in managing at a top level. The use of mathematical tools for analysis is stressed.

Source: Jackson, J. R., *UCLA Executive Decision Game No. 2*, Participant's Information Manual, Graduate School of Business, University of California at Los Angeles, Los Angeles, California.

## FUNCTIONAL GAMES

(7) *FINANSIM. A Financial Management Simulation (Finance)*

FINANSIM is a non-interactive game designed for augmenting financial management skills. Participants manage a manufacturing firm and make decisions about the acquisition and use of capital, liquidity and debt levels. At the same time, they have to decide about plant and machine capacity, so that they can see the relationships between these problems and financial management. As in MARKSIM, the game is used together with a text emphasising and discussing financial problems related to the game.

Source: Greenlaw, P. S., and Frey, M. W., *FINANSIM. A Financial Management Simulation*, International Textbook Company, Scranton Pa., 1967.

(8) *Marketing in Action—a decision game* (Marketing)

This moderately complex game tries to teach sound managerial practices, and stresses particularly strategy formulation and planning. It focuses mainly on the marketing area, but production and finance are also present, so that participants feel they are managing a firm in which marketing is an important aspect, rather than just operating a marketing department without links to the rest of the firm.

Source: Day, R. L.[16].

(9) *MARKSIM. A Marketing Decision Simulation* (Marketing)

Each group is assumed to manage a manufacturing firm and has to make marketing decisions, along with determining the level of production and the level of loans. The purpose is to provide the participants with experience in a competitive marketing situation. MARKSIM is used together with a text which discusses different aspects of marketing related to the game.

Source: Greenlaw, P. S., and Kniffin, F. W., *MARKSIM. A Marketing Decision Simulation*, International Textbook Company, Scranton, Pa., 1964.

(10) *MIT Marketing Game* (Marketing)

This game is one of the most detailed games that exist. Each team makes many decisions in marketing as well as in other functional areas. For each kind of decision—say, product quality—a number of specific decisions are to be made. The purpose is to provide experience in a complex and uncertain situation, and to improve skills in managerial analysis and decision-making, as well as in communications and interpersonal relations.

Source: Amstutz[4].

(11) *Personnel Assignment Management Game* (Personnel)\*

In this non-competitive game, each team has to assign to audit jobs a number of audit teams whose efficiency varies widely. The objective is to maximise the efficiency of all teams. After four periods, the game is stopped and linear programming is explained to the players. Then the game resumes, and the players are expected to use linear programming to solve their assignment problems. The purpose of the game is obviously to show how linear programming can be used in personnel assignment and to serve as a field for experiments.

Source: Greene, J. R., and Sisson, R. L., *Dynamic Management Decision Games*, Wiley and Sons Inc., New York, 1959.

(12) *PROSIM. A Production Management Simulation* (Production)\*

Each team has to manage the production operations of a firm. Each period—corresponding to one day—it has to make decisions on quality control, plant maintenance, job scheduling, work-force management and inventory management. The game is designed to provide experience in production management. It is used in conjunction with a text which illustrates and discusses various problems of production management as well as a number of analytical tools which can help in that field.

Source: Greenlaw, P. S., and Hottenstein, M. P., *PROSIM. A Production Management Simulation*, International Textbook Company, Scranton, Pa., 1968.

## INDUSTRY GAMES

(13) *A Life Insurance Company Management Game* (Insurance)\*

In this complex industry game, each team is assumed to manage a life insurance company and has to make a number of decisions regarding marketing, costs and investments. The purpose of the game is to familiarise the players with the complexity of the operations of a life insurance company and to give them experience with the general management of such a firm.

Source: Minnesota Mutual Life Insurance Company, Actuarial Department, 345, Cedar Street, St. Paul, Minnesota.

(14) *Purdue Supermarket Management Game* (Retailing)

The purpose of the game is to familiarise participants with the operating of a supermarket, to show the interrelationships between the different factors and to give the participants experience in using analytical tools, economic and accounting principles and planning.

Source: Babb, E. M., and Eisgruber, L. M.[6].

(15) *Stanford Bank Management Simulation* (Banking)\*

In this game, players manage a commercial bank which operates in an environment simulating the US banking environment around 1960. In its short form, participants make general decisions in banking: interest rates, advertising and promotion, salary levels, etc. In its long form, decisions on bank expansion, increase of capital, . . . can also be made. The purpose is to give participants a general view of banking and to show the relationships between their decisions and the general economic conditions.

Source: Robichek, A. A., Haley, C. W., and Wiebuhr, W. D., *Stanford Bank Management Simulator*, Graduate School of Business, Stanford University, Stanford, Ca., 1965.



## Notes

1. In this paper, we will not distinguish in the use of the terms *business game* and *management game*.
2. For an excellent analysis of this concept, see Churchman[11].
3. See for example, Ricciardi and al.,[46], p. 59.
4. The reader who is interested in the origin and evolution of war games can refer to Thomas[56] or Wilson[59].
5. A review of more than 150 games used for training purposes can be found in Graham and Gray[22].
6. These arguments are developed for example by Cohen, Dill, Kuehn, and Winters[14], p. 106.
7. For example, a game may be the occasion to draw the attention of actual managers to their own decision style and, for instance, to make them more aware of the consequences of sequential attention to problems, a trait that appears to be fairly common in managerial decision-making.
8. For typical examples of such goals, see the alleged objectives of many of the games reviewed in Graham and Gray[22].
9. Herron[26], p. 4, as quoted by Greer[24], pp. 18 and 19.
10. The Carnegie Tech Management Game for example, provides more than a thousand items of information and requires one hundred to three hundred decisions per period. These include, among others, purchase of raw materials, hiring and firing of workers, inventory control, research and development decisions, plant investment, distribution, advertising expenditures, financial decisions, . . . For a complete description of the game, see Cohen and al.,[12], and [14].
11. This game is described in Schrieber[47].
12. Cohen and Rhenman give several examples of such games; see [13], pp. 137-138. See also Graham and Gray[22].
13. For examples of these uses, see Graham and Gray[22].
14. The reasons of that trend towards more complexity have been explained above.
15. See discussion, p. 8.
16. See for example Amstutz[2], Cohen and Rhenman[13], Forrester[20], and Greer[24].
17. For a comprehensive discussion of the costs involved in gaming, see Shubik[50].
18. See discussion p. 8.
19. That question has already received some attention in our review of the different educational uses of games.
20. With the exception of the marketing policy however.
21. In order to measure the risk taking preference, Lewin and Weber used the Social Risk Preference (SRP) questionnaire which Kogan and Wallach[30] had shown to correlate with other measures of risk-taking. This questionnaire presents the subject with a number of situations in which someone faces a problem. The subject has to advise the embarrassed person by choosing a proposition among a set of possible solutions which have each different outcomes but also different degrees of risk.
22. These studies were:
  - (1) Chapman, R. L., Kennedy, J. L., Newell, A., and Biel, W. C., "The Systems Research Laboratory's Air Defense Experiments", *Management Science*, 5, 1959, pp. 250-269.
  - (2) Cyert, R. M., and March, J. G., *A Behavioural Theory of the Firm*, Prentice-Hall, Englewood Cliffs, N.J., 1963.
  - (3) Hirschman, A. O., and Lindblom, C. E., "Economic Development, Research and Development, Policy Making: Some Converging Views", *Behavioural Science*, 8, 1962, pp. 211-222.
23. Interaction potential as defined by Bass[7] is the tendency of any two individuals to interact.
24. A similar method has been previously used to study task-orientated groups by Bavelas[9] and Guetzkow[25].

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