Game-Based Learning for Supply Chain Management:
Assessing the Complexity of Games

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ABSTRACT

Game-based learning has proven to be an effective teaching method in a variety of fields, including supply chain management (SCM). This paper discusses the use of simulation-based business games for training and education in SCM by evaluating the complexity of SCM games. The main contributions of this study are twofold. (1) Creation of a database of available games used for training and education in SCM. For the first time, 40 games were selected, and a comprehensive review of the complexity elements included in these games is presented. (2) Development of a game complexity index to classify, evaluate and order the selected games according to their complexity. The findings of this study will be useful to academics and practitioners interested in logistics and SCM professional training and education. It helps educational institutions how to choose the best game for specific SCM topics.

KEYWORDS

Business Games, Complexity, Game-Based Learning, Management Education, Simulation Games, Supply Chain Games, Supply Chain Management

INTRODUCTION

A supply chain (SC) is a complex system that includes multiple entities and activities involving the movement of goods and the addition of value from the raw material stage to the final delivery stage (Herzog & Katzlinger, 2011). Managing a modern SC is complex and challenging; SC managers must deal with multidimensional problems that have complex side effects and non-linear dependencies (Muller et al., 2015). Because of this complexity, it is difficult to predict the consequences of decisions made. Future SC managers must be trained to make decisions under uncertainty and to consider the impact of their decisions on the entire SC (Baalsrud Hauge et al., 2016).

Modern businesses realise that having a well-trained supply chain management (SCM) team is critical to success (Mandaza & Goriwondo, 2012). Traditionally, SCM training has been limited to cognitive methods of instruction such as textbooks, case studies, and traditional class lectures. Such methods may help students understand SCM's fundamental concepts, but they fail to highlight the bigger picture of the SC and the strategic decisions that must be made (Tobail et al., 2011). It is not enough to simply inform students about how something as vital as SCM works; they must also experience it. In this context, one potentially effective way of increasing the efficiency of SCM

courses is to incorporate game-based learning (GBL) along with other teaching methods (Cvetic´ & Vasiljevic´, 2012; William et al., 2018).

Simulation games represent alternative educational and training methods that can simulate a real-world environment while maintaining a balance between theory and practice (Arora & Saxena Arora, 2015). This allows students to learn through experience, experiment with various decisions, and learn from the feedback (Baalsrud Hauge et al., 2016). Furthermore, simulation games convey not only hard skills, such as the understanding of how complex SC systems operate, but they also mediate soft skills such as collaboration and communication, which is especially important when attempting to implement new concepts such as information sharing and engaging in various coordination and alignment contracts with others.

Several logistics and SCM games can be used in teaching and learning processes. The advancements in computer technology have also contributed to the development of new SCM games as well as the enhancement of existing ones. As a result, the number of SCM games produced every year is growing along with the number of organisations adopting this kind of learning for their staff training programmes. The main question here might be: How to select the most suitable game for specific courses?

Educational institutions are faced with the problem of a lack of a database containing information on existing SCM games. Furthermore, most GBL in SCM focus on only one or a limited number of concepts and scenarios. For example, one of the most well-known games in SCM and part of many SCM curricula is the original Beer Game developed in the 1960s (Sterman, 1989). The game is designed as a pure retail distribution game and does not take product conversion, capacity, and process reliability into account, which limits its implementation (William et al., 2018). This necessitates understanding how complex the models of existing games are to select the best game for a specific course's requirements.

This study adds to the literature by providing a recent database containing 40 games used in logistics and SCM training and education. The review of SCM games allows for the identification of the main development trends of such a training and educational tool. Furthermore, the attributes of the chosen games are considered when assessing the game's complexity and closeness to reality. Games are categorised based on a developed index for each game's technical features and model realism, and finally, the games are compared and ordered based on a developed game complexity index (GCI).

The findings of this study are useful for academics and practitioners interested in the training and education of logistics and SCM professionals. It will help them select the most suitable games for specific courses to deliver appropriate courses in a professional way to future SC managers.

BACKGROUND

Several SCM games have been introduced and discussed in the literature, covering a wide range of SCM concepts and scenarios. When it comes to games for teaching and training, game realism and complexity have long been linked in the literature. The developments in computer technology have created ways to give games a high degree of realism, which represents higher complexity (Leemkuil et al., 2000). Considerable effort has been made in the literature to present some measures or indicators for the complexity of serious games (Deghedi, 2018). However, the issue of comparing the complexity of existing SCM games is limited and still requires further research and discussion.

Some studies have attempted to list and compare SCM games based on various complexity indicators; for example, Corsi et al. (2006) investigated the impact of playing games on developing SC managers' skills, with attention focused on the Global Supply Chain Game (GSCG) and how it differs from other business learning games. Specifically, they compared the GSCG to six other SCM games, including the Beer Game, Logistics Game (LOGA), Littlefield Technologies, the Trading

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