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USING GAMES TO ENHANCE TEACHING BUSINESS LOGISTICS AND SUPPLY CHAIN MANAGEMENT: EXPERIENCE FROM SERBIA

The importance of developing logistics and supply chain management skills has gained wide acceptance in economic and management education in the last few decades. This paper focuses on the collection, selection, employment and evaluation of games suitable to enhance teaching processes in 2 courses related to business logistics and supply chain management at the Faculty of Organizational Sciences, the University of Belgrade. The database of logistics and supply chain management games has been created on the secondary data sources, and a multi-criteria analysis of games was designed and applied for the selection of suitable games. The post-game evaluation was carried out with Likert-type questionnaires. This study has shown that students like playing logistics and supply chain management games and that playing these games helps them to learn something they have not previously known. The results and experience of this study can be helpful and useful for educators in economic and management schools.

Keywords: *games-based learning, business logistics, supply chain management, economic and management education.*

JEL classification: *A22, C88, I23, M19.*

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ВИКОРИСТАННЯ ІГОР ДЛЯ ПІДВИЩЕННЯ ЯКОСТІ ВИКЛАДАННЯ ЛОГІСТИКИ І УПРАВЛІННЯ ЛАНЦЮЖКОМ ПОСТАЧАНЬ (ДОСВІД СЕРБІЇ)

У статті показано, що логістика і управління ланцюжком постачань стали популярними напрямами освіти в останні декілька десятиліть. Проаналізованіо і оцінено ігри, які підходять для процесу навчання двох курсів, пов'язаних із бізнес-логістикою і управлінням ланцюжками постачань на факультеті організаційних наук Університету Белграду. База даних ігор з логістики і управління ланцюжками постачань була створена на основі вторинних джерел даних і для вибору відповідних ігор було розроблено і застосовано багатокритеріальний аналіз. Оцінювання ігор проводилось за допомогою анкет типу Лайкерта. Це дослідження показало, що студентам подобаються ігри з логістики і управління ланцюжком постачань і що ці ігри дають їм нову інформацію. Результати даного дослідження можуть бути корисні викладачам економічних і управлінських шкіл.

Ключові слова: *ігроорієнтоване навчання, бізнес-логістика, управління ланцюжками постачань, економічна і управлінська освіта.*

Таб. 6. Рис. 1. Літ. 20.

Биляна Цветич, Драган Василевич

ИСПОЛЬЗОВАНИЕ ИГР ДЛЯ ПОВЫШЕНИЯ КАЧЕСТВА ПРЕПОДАВАНИЯ ЛОГИСТИКИ И УПРАВЛЕНИЯ ЦЕПОЧКОЙ ПОСТАВОК (ОПЫТ СЕРБИИ)

В статье показано, что логистика и управление цепочкой поставок стали популярными направлениями образования в последние несколько десятилетий.

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Проанализированы и оценены игры, подходящие для процесса обучения двух курсов, связанных с бизнес-логистикой и управлением цепочками поставок на факультете организационных наук Университета Белграда. База данных игр по логистике и управлению цепочками поставок была создана на основе вторичных источников данных, и для выбора подходящих игр был разработан и применен мультикритериальный анализ. Оценка игр проводилась с помощью анкет типа Лайкерта. Это исследование показало, что студентам нравятся игры по логистике и управлению цепочкой поставок и что эти игры дают им новую информацию. Результаты данного исследования могут быть полезны преподавателям экономических и управленческих школ.

Ключевые слова: *игроориентированное обучение, бизнес-логистика, управление цепочками поставок, экономическое и управленческое образование.*

1. Introduction. The methods of development business logistics and supply chain management (SCM) skills and competencies have received growing importance in economic and management education in the last few decades. The application of games in combination with other teaching methods offers opportunities for improveming specific skills of future professionals in the field of economics and management, as well as existing professionals who want to improve their problem-solving effectiveness and efficacy. Johnson and Pyke (2000) emphasized that at least one game, simulation and/or interactive exercise are used in addition to lectures and case studies for teaching SCM. These games allow students play different roles, e.g. a distribution manager, a transportation planner, a retailer manager, a logistics manager, a logistics planner, a supply chain manager etc., in an environment without real risks which consists of virtual entities, such as factories, products, transport vehicles, distribution centers, wholesalers, retailers etc. A wide variety of games are developed that can be employed for the purposes of business logistics and SCM education. Their direct predecessors can be found in the work by Mary Birshstein in the 1930s and 1940s in Europe on game development for supporting training programs in production and distribution and by RAND Corporation in 1950s in North America on game development focused on the U.S. Air Force logistics system (Faria et al. 2009). Unquestionably, the most famous is Beer Game developed by Professor John D. Sterman at MIT in the early 1960s (Sterman, 1989; Campbell, et al. 1999; Zeng and Johnson, 2009). A list of 8 publicly available logistics and SCM games suitable for students' education was provided by Campbell et al. (1999). Lewis and Maylor (2007) analysed a wide variety of operations management teaching and training games among which they recognized 10 logistics and supply chain related games. At the Tippie College of Business, University of Iowa, the BizGames Project has the aim to collect and present information on available logistics and SCM games and games that can be applied in other management areas (BizGames Project, 2012). Therefore, there are numerous logistics and SCM games that can be employed and the main question might be: how to select the most suitable games for the courses in the field of business logistics and SCM? Getting the right answers to these question and exchange of experience in logistics and SCM game playing is valuable to educators in economic and management schools interested in development of game-based environment.

At the Faculty of Organizational Sciences (FOS), University of Belgrade, game-based learning (GBL) and face-to-face learning have been combined in the courses

of Business Logistics and Supply Chain Management. The Business Logistics course is compulsory and Supply Chain Management is optional in the undergraduate program of Operations Management. The aim of the Business Logistics course is to provide undergraduate students with knowledge and skills on the fundamentals and methods of logistics management. It is a one-term course taught in the fifth semester. The aim of the Supply Chain Management course is to provide students with the understanding of strategic importance of supply chains in the global environment, and with the methods, tools, and activities necessary for efficient and effective SCM. It is a one-term course, taught in the eighth semester.

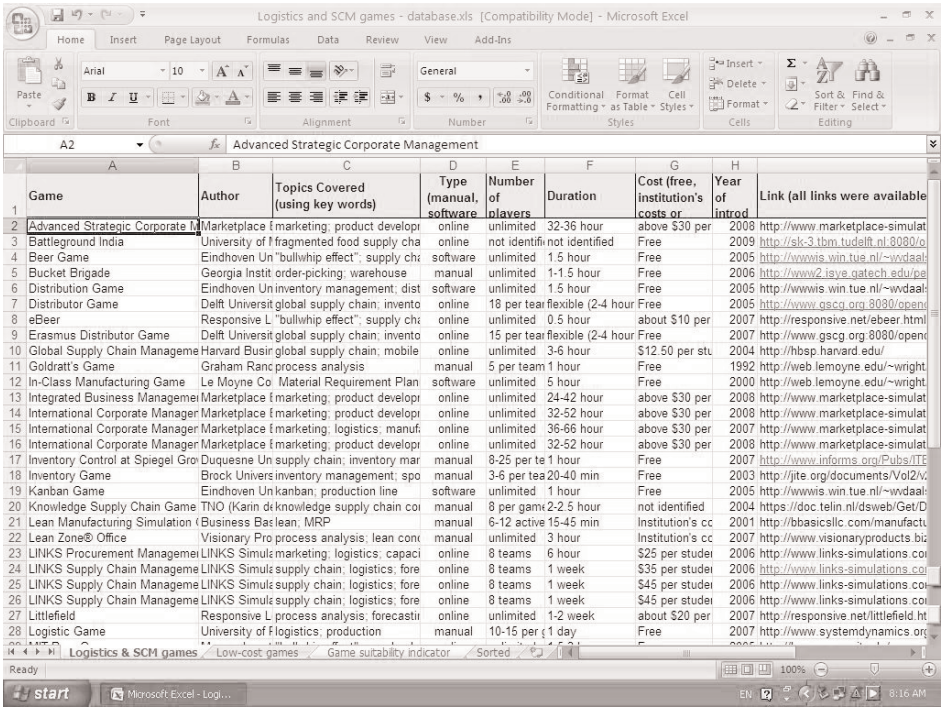
This paper is focused on selection, application and evaluation of games suitable to enhance teaching in these two courses. The remainder of the paper is organized as follows. In the next section, the methodology is presented with emphasis on the selection procedure of games for purposes of teaching in Business Logistics and Supply Chain Management courses at the FOS. The results of the post-game evaluation are presented in the section "Evaluation of games". Then, the discussion of the results is given. Finally, some concluding remarks and directions of future research are offered.

2. Methodology. In order to deliver logistics and supply chain management skills through two courses at the FOS, first a selection procedure for identifying suitable games for these courses was designed and applied, then the selected games were evaluated by students and instructors, and finally the future directions of research were considered. The selection procedure of suitable games incorporated a database of available logistics and SCM games and a multicriteria analysis based on instructors' assessment and computation of a game suitability indicator. The secondary data (Zikmund et al., 2010), mostly from Internet sources and libraries were used for the creation the database of logistics and SCM games. The instructors' demonstration and analysis were incorporated in some cases to avoid suggestions from other authors. Likert-type questionnaires (Zikmund et al., 2010; Kotzab et al., 2005) were prepared and used for students' post-game evaluation.

2.1. Selection of games. The selection procedure was comprised of the following steps:

1. Creation of a database of available logistics and SCM games;
2. Extraction of the games based on the criteria of the cost for their usage;
3. Assessment of game suitability for requirements of courses; and
4. Reviewing the obtained results and needs of teaching logistics and SCM.

In the first step, the database of available logistics and SCM games was created which included the total of 47 games (Figure 1). The results of the BizGames Project helped shape the creation of the study's database. It is assumed that this database is a very useful although the number of included logistics and SCM games is probably not finite. The data for each game included: the name of a game, the author of a game, topics covered by using keywords, the type of a game (manual, software or online), the number of players, duration, cost (free, institution's costs or student's costs), the year of introduction, and a link to the game and additional data on it.



	Game	Author	Topics Covered (using key words)	Type (manual, software	Number of players	Duration	Cost (free, institution's costs or	Year of introd	Link (all links were available
2	Advanced Strategic Corporate M	Marketplace I	marketing; product developr	online	unlimited	32-36 hour	above $30 per	2008	http://www.marketplace-simulat
3	Battleground India	University of I	fragmented food supply cha	online	not identifi	not identified	Free	2009	http://sk-3.tbm.tudelft.nl:8080/o
4	Beer Game	Eindhoven Un	"bullwhip effect"; supply cha	software	unlimited	1.5 hour	Free	2005	http://wwwis.win.tue.nl/~wdaal
5	Bucket Brigade	Georgia Instit	order-picking; warehouse	manual	unlimited	1-1.5 hour	Free	2006	http://www2.isye.gatech.edu/pe
6	Distribution Game	Eindhoven Un	inventory management; dist	software	unlimited	1.5 hour	Free	2005	http://wwwis.win.tue.nl/~wdaal
7	Distributor Game	Delft Universit	global supply chain; invento	online	18 per tear	flexible (2-4 hour	Free	2005	http://www.gscg.org:8080/open
8	eBeer	Responsive L	"bullwhip effect"; supply cha	online	unlimited	0.5 hour	about $10 per	2007	http://responsive.net/ebeer.html
9	Erasmus Distributor Game	Delft Universit	global supply chain; invento	online	15 per tear	flexible (2-4 hour	Free	2007	http://www.gscg.org:8080/open
10	Global Supply Chain Manageme	Harvard Busir	global supply chain; mobile	online	unlimited	3-6 hour	$12.50 per stu	2004	http://hbsp.harvard.edu/
11	Goldratt's Game	Graham Ranc	process analysis	manual	5 per team	1 hour	Free	1992	http://web.lemoyne.edu/~wright
12	In-Class Manufacturing Game	Le Moyne Co	Material Requirement Plan	software	unlimited	5 hour	Free	2000	http://web.lemoyne.edu/~wright
13	Integrated Business Manageme	Marketplace I	marketing; product developr	online	unlimited	24-42 hour	above $30 per	2008	http://www.marketplace-simulat
14	International Corporate Manager	Marketplace I	marketing; product developr	online	unlimited	32-52 hour	above $30 per	2008	http://www.marketplace-simulat
15	International Corporate Manager	Marketplace I	marketing; logistics; manuf	online	unlimited	36-66 hour	above $30 per	2007	http://www.marketplace-simulat
16	International Corporate Manager	Marketplace I	marketing; product developr	online	unlimited	32-52 hour	above $30 per	2008	http://www.marketplace-simulat
17	Inventory Control at Spiegel Gro	Duquesne Un	supply chain; inventory mar	manual	8-25 per te	1 hour	Free	2007	http://www.informs.org/Pubs/ITE
18	Inventory Game	Brock Univers	inventory management; spo	manual	3-6 per tea	20-40 min	Free	2003	http://jite.org/documents/Vol2/v
19	Kanban Game	Eindhoven Un	kanban; production line	software	unlimited	1 hour	Free	2005	http://wwwis.win.tue.nl/~wdaal
20	Knowledge Supply Chain Game	TNO (Karin d	knowledge supply chain coi	manual	8 per game	2-2.5 hour	not identified	2004	https://doc.telin.nl/dsweb/Get/D
21	Lean Manufacturing Simulation (	Business Bas	lean; MRP	manual	6-12 active	15-45 min	Institution's co	2001	http://bbasicsllc.com/manufactu
22	Lean Zone® Office	Visionary Pro	process analysis; lean conc	manual	unlimited	3 hour	Institution's co	2007	http://www.visionaryproducts.biz
23	LINKS Procurement Manageme	LINKS Simula	marketing; logistics; capaci	online	8 teams	6 hour	$25 per studer	2006	http://www.links-simulations.co
24	LINKS Supply Chain Manageme	LINKS Simula	supply chain; logistics; fore	online	8 teams	1 week	$35 per studer	2006	http://www.links-simulations.co
25	LINKS Supply Chain Manageme	LINKS Simula	supply chain; logistics; fore	online	8 teams	1 week	$45 per studer	2006	http://www.links-simulations.co
26	LINKS Supply Chain Manageme	LINKS Simula	supply chain; logistics; fore	online	8 teams	1 week	$45 per studer	2006	http://www.links-simulations.co
27	Littlefield	Responsive L	process analysis; forecastir	online	unlimited	1-2 week	about $20 per	2007	http://responsive.net/littlefield.ht
28	Logistic Game	University of I	logistics; production	manual	10-15 per g	1 day	Free	2007	http://www.systemdynamics.org

Figure 1. **Initial game database, authors' screen shot**

In the second step the games are separated based on two established criteria related to costs:

1. Games with zero cost.
2. Institution's costs for using games are below $250.

The introduction of these criteria in the selection procedure is important because of the austerity in our academic environments. Currently, it will be unreal to demand additional costs from our students. The application of these criteria on the initial database resulted in the selection of the total of 27 games for further analysis.

In the third step the assessment of game suitability for courses requirements is done based on a developed game suitability indicator. The game suitability indicator is a combined weighting of functionality, simplicity, duration and ease of setup. Functionality is assessed on the five-point scale, from 1 (very poor) to 5 (very good). Simplicity is assessed on the 5-point scale, from 1 (very hard) to 5 (very easy). Duration is assessed on the three-point scale, from 1 (too long) to 3 (appropriate), where "too long" means more than 6 hours and "appropriate" means up to 3 hours. Ease of setup is assessed on the three-point scale, from 1 (hard) to 3 (easy). Thus, the maximum value of game suitability indicator is 225. Games with the value of this indicator above 112.5 are selected for further analysis, and the total of 8 games satisfies this condition. They are presented in Table 1.

Table 1. **Games selected on the basis of game suitability indicator**

No.	Game	Functionality	Simplicity	Duration	Ease of setup	Game suitability indicator
1.	The Computerized Beer Game	5	5	3	3	225
2.	The Distribution Game	5	5	3	3	225
3.	The Transportation Game	5	5	3	3	225
4.	Risk Pool Game	4	5	3	3	180
5.	Goldratt's Game	4	5	3	3	180
6.	Bucket Brigade	5	4	3	2	120
7.	Kanban Game	5	4	3	2	120
8.	MIT Beer Game	5	4	3	2	120

In the fourth step the selected games are reconsidered in relation to the needs of teaching logistics and SCM. It is decided to use the Kanban Game as a supplement to the topic of lean logistics and The Distribution Game as a supplement to a short overview of the topic of SCM in the Business Logistics course. Also, it is decided to use The Computerized Beer Game as a supplement to the topic of coordination and bullwhip effect, the Risk Pool Game to support the topic of risk pooling in the supply chain and The Transportation Game to support the topic of transportation and warehouse management in the Supply Chain Management course. There were some doubts which game to use: the Computerized Beer Game or the MIT Beer Game. The demonstration of these games in the computer laboratory environment showed that students' progress in understanding the 'bullwhip effect' was harder when they used the MIT Beer Game online, and students were suggested to use it at home. The Goldratt's Game and the Bucket Brigade game were left for some future consideration for the next generation of students.

3. Evaluation of Games. The games were evaluated by undergraduate students of Business Logistics and Supply Chain Management courses at the FOS during the summer semester of 2010/2011 and the winter semester of 2011/2012. The post-game questionnaires consisted of the two parts of statements, one for evaluation of the certain game and the second one for the evaluation of instructors. Students were asked to rate their experience with playing certain games on the five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The Kanban game was evaluated by 26 third-year undergraduate students and the Distribution Game by the same group of students (but this time the total of 24 students participated) at the Business Logistics course. The Beer Game and the Transportation Game were evaluated by 27 fourth-year undergraduate students, and the Risk Pool Game was evaluated by the same students (but this time the total of 25 students participated) at the Supply Chain Management course. During this research, instructors were rated with very high scores and these results are omitted. This might be explained with the previously well established relationships between students and instructors.

3.1. Kanban Game. The Kanban Game is a simulation of inventory management in one work center with the help of kanban. This game is developed by Welters, M. under the supervision of van der Aalst, W.M.P. from the Eindhoven University of

Technology, based on the idea of The Kanban System Game (Strategos International, 2012).

The results of evaluation the Kanban Game are presented in Table 2. The students gave the highest scores to the statement that the Kanban Game helped them "understand better the purpose of determining safety stock levels". The mean (M) for this statement was 4.58 with a relatively low variance (V) (0.33) and standard deviation (SD) (0.58). The participating students gave the lowest scores to the statement that "inventory management in one work center with the help of kanban by using the Kanban Game is interesting". The M for this statement was 3.58 with the relatively high V (1.69) and SD (1.30). Despite this, they were very positive about having "more games like the Kanban Game to be used in teaching processes".

Table 2. **Evaluation of Kanban Game**

Statement		Mean	Variance	SD
1.	Inventory management in one work center with the help of kanban by using the Kanban Game is interesting.	3.58	1.69	1.30
2.	Using the Kanban Game is easy.	4.19	0.96	0.98
3.	Playing the Kanban Game helped me learn something I had not previously known.	3.65	0.88	0.94
4.	I understand better the purpose of determining safety stock levels after playing the Kanban Game.	4.58	0.33	0.58
5.	I understand better the importance and the complexities of inventory management problem in one work center with the help of kanban in practice.	3.85	0.78	0.88
6.	I would like more games like the Kanban Game to be used in teaching processes.	4.31	0.86	0.93

From the instructors' view, the Kanban Game is a game with simple logics, easily understood by students. It provides great possibility of graphical monitoring inventory and kanban stock levels. As students moved closer to the last simulated day, their attention may have weakened. They experienced some difficulties in running the game, although the appropriate Java environment and CPN Tools were properly installed. On average 15 minutes of class time were lost helping students (group of 10-15 students) run the game.

3.2. Distribution Game. The Distribution Game is a simulation of inventory management in a multi-level distribution system (Jackson, 2012). This game is developed by Jackson, P. L. and Muckstadt, J. A. from the School of Operations Research and Industrial Engineering of Cornell University. Newer versions of the game exist, but thanks to the simplicity of using and ease of setup, although it dates from 1995, this game has still its place in current courses.

The results of evaluation the Distribution Game are presented in Table 3 and, as it can be seen, students had very positive experience with this game. The students gave the highest scores to the statement that "inventory management in a distribution system with the help of the Distribution Game is interesting" (M=4.67, V=0.41, SD= 0.64) and that "using the Distribution Game is easy" (M=4.67, V=0.32, SD=0.56). They gave the lowest scores to the statement that playing the Distribution Game helped them learn something new. This might come as a surprise when the scores of the 4th and 5th statements are considered, but the reason for this discrepancy might lie in good knowledge that students had previously acquired in relation with inventory management in a distribution system.

Table 3. **Evaluation of the Distribution Game**

Statement		Mean	Variance	SD
1.	Inventory management in a distribution system with the help of the Distribution Game is interesting.	4.67	0.41	0.64
2.	Using the Distribution Game is easy.	4.67	0.32	0.56
3.	Playing the Distribution Game helped me learn something I had not previously known.	4.00	0.61	0.78
4.	I understand better the determination of inventory costs after playing the Distribution Game.	4.33	0.84	0.92
5.	I understand better the importance and the complexities of inventory management problem in the distribution system in practice.	4.42	0.78	0.88
6.	I would like more games like the Distribution Game to be used in teaching processes.	4.58	0.95	0.97

From the instructors' view, the Distribution Game is a simple and very useful game for the improvement of students' understanding of inventory management. We introduced the students to the game parameters and gave them an additional condition - to meet the demand of all end customers (i.e. reach the fill rate of 100%). They competed to maximize the net profit. Usually, we can recognize two types of students, the ones who have tendency to pile up excess inventory in order to protect from stock out, and others who have the problem to timely meet the demand because of the too low level of inventory. Students “are willing to play as long as you let them” (Ammar and Wright, 1999). When we stopped the competition for a while to discuss the inventory models and calculation of costs we always had students who still stealthily played the game despite our request to stop. It could be said that this game can also show some aspects of students' nature in sense of prudence, risk preferences, and competitive spirit.

3.3. The Computerized Beer Game. The Computerized Beer Game is a simulation of a beer supply chain that allows illustration of the 'bullwhip effect' (Simchi-Levi et al., 2000). This game is developed by Kaminsky, P. from the University of California and Simchi-Levi, D. from the Northwestern University, and presents a computerized version of the MIT Beer Game. The first version of the Beer Game was manual and it was supported with the board for beer production and distribution (Sterman, 1989).

The results of evaluation the Computerized Beer Game (Table 4) show that students had positive experience with this game. The students gave the highest scores to the statement that Beer Game helped them "understand better the appearance of bullwhip effect" (M=4.11, V=0.87, SD=0.93) and that they "would like more games like the Beer Game to be used in teaching processes" (M=4.11, V=1.49, SD=1.22). The statement "using the Beer Game is easy" got the lowest scores (M=3.56, V=1.18, SD=1.09). This can be explained by the observed expectations of some students to achieve the best scores in playing game (minimum of the total supply chain costs) in a very short period of time. Their dissatisfaction with their own early results affected the assessment of this statement.

From the instructors' viewpoint, the Computerized Beer Game is a very suitable game to bring 'bullwhip effect' in a supply chain closer to students. They seemed very interested in playing it. The uncertainty of demand and delivery often caused students' loud comments. After playing the game for the first time, the students were very surprised with the structure and amount of total costs. They usually finished 23 sim-

ulated weeks in a role of a retailer with the total supply chain costs about $1,300 with their share of one-quarter of these costs. We provided them with the analysis of their results and gave them further proposals of how to establish better cooperation in a supply chain. In the following attempts to play the game, students succeeded to reduce the total supply chain costs below $800. They realized that the fluctuations in the supply chain were driven internally and that they had to find the ways to overcome problems.

Table 4. **Evaluation of the Computerized Beer Game**

Statement		Mean	Variance	SD
1.	Inventory management in a supply chain with the help of the Beer Game is interesting.	3.70	0.83	0.91
2.	Using the Beer Game is easy.	3.56	1.18	1.09
3.	Playing the Beer Game helped me learn something I had not previously known.	3.78	1.26	1.12
4.	I understand better the appearance of bullwhip effect after playing the Beer Game.	4.11	0.87	0.93
5.	I understand better the importance and the complexities of problem of eliminating bullwhip effect in a supply chain.	4.00	0.69	0.83
6.	I would like more games like the Beer Game to be used in teaching processes.	4.11	1.49	1.22

3.4. Risk Pool Game. The Risk Pool Game allows illustration of the concept of risk pooling in a supply chain. This game is developed by Kaminsky, P. from the University of California and Simchi-Levi, D. from the Northwestern University.

The results of evaluation the Risk Pool Game are presented in Table 5. The students gave the highest scores to the statement that "using the Risk Pool Game is easy". The M for this statement was 4.96 with the relatively low V (0.04) and SD (0.20). One of the main purposes of playing this game was to point out the differences between the system with risk pooling and the system without it. The statement related to that purpose got very high score, too (M=4.84, V=0.14, SD=0.37). The statement the "system management with risk pooling with the help of the Risk Pool Game is interested" got the lowest score (M=3.64, V=0.74, SD=0.86). The reason for this score probably lies in the fact that this game suggests the values to the players.

Table 5. **Evaluation of the Risk Pool Game**

Statement		Mean	Variance	SD
1.	System management with risk pooling with the help of the Risk Pool Game is interesting.	3.64	0.74	0.86
2.	Using the Risk Pool Game is easy.	4.96	0.04	0.20
3.	Playing the Risk Pool Game helped me learn something I had not previously known.	4.08	0.49	0.70
4.	I understand better the concept of risk pooling in a supply chain after playing the Risk Pool Game.	4.56	0.34	0.58
5.	I understand better the differences between the system with risk pooling and system without risk pooling.	4.84	0.14	0.37
6.	I would like more games like the Risk Pool Game to be used in teaching processes.	4.72	0.21	0.46

From the instructors' viewpoint, the Risk Pool Game is a very simple game which helps to explain the concept of risk pooling in a supply chain. Students can easily understand the role of a warehouse in the system with risk pooling and the bene-

fits of using such a system. Some of the students expressed the opinion that they would like to play this game without the suggested values because they felt that in that case they would probably have higher levels of responsibility.

3.5. Transportation Game. The Transportation Game is a simulation of routing and scheduling delivery vehicles. This game is developed by Jackson, P. L. and Muckstadt, J. A. from the School of Operations Research and Industrial Engineering, Cornell University.

The results of evaluation the Transportation Game (Table 6) show that the students had very positive experience with this game. The students gave the highest scores to the statement that they "understand better the purpose of monitoring parameters" in the vehicle fleet management. The M for this statement was 4.81 with the relatively low V (0.16) and SD (0.40). They "would like more games like the Transportation Game to be used in the teaching processes" (M=4.81, V=0.23,=SD 0.48).

Table 6. **Evaluation of the Transportation Game**

Statement		Mean	Variance	SD
1.	Vehicle fleet management with the aim to order delivery using the Transportation Game is interesting.	4.41	0.64	0.80
2.	Using the Transportation Game is easy.	4.11	0.64	0.80
3.	Playing the Transportation Game helped me learn something I had not previously known.	4.19	0.46	0.68
4.	I understand better the purpose of monitoring parameters: the total number of used trucks, the total mileage across all trips, the total delivery days, the average customer wait, and the maximum customer wait.	4.81	0.16	0.40
5.	I understand better the importance and the complexities of the problem of routing vehicles in practice.	4.59	0.33	0.57
6.	I would like more games like the Transportation Game to be used in teaching processes.	4.81	0.23	0.48

From the instructors' viewpoint, the Transportation Game is a game suitable to introduce students with the vehicles routing problem. Our students were very interested in playing it, although the game originates from 1995. The game offers the testing of various strategies of delivery products to customers with 10 trucks. Some students proposed to include an additional scenario in the game with randomness in sequence and size of customers' orders.

4. Discussion of Results. The results of using 5 games in Business Logistics and Supply Chain Management courses at the FOS showed that students like to play logistics and SCM games, they learn something from playing these games that they have not previously known and they would like to use more games like these in their studies. The instructors were very surprised at how students evaluated the Distribution Game and the Transportation Game. The scenarios of these games were amusing for students and they were very interested in playing them even though these games originate from the 1990s. Although the results are based on the small samples of students, their positive experience with using logistics and SCM games suggests that the games will be used even more in the years to come.

The database of total 47 available logistics and SCM games is created on secondary data sources, mostly from the Internet and libraries. Among other things, the link to access the game and/or to additional data about it is given for each game. After

the completion of the evaluation in the winter semester of 2011/2012, the database is updated with the Supplying Hoop Dreams game (Kazaz and Moskowitz, 2000), Federal-Mogul Business Game (Petty et al., 2001) and HECOpSim game (Pasin and Giroux, 2011). This database is available from the first author upon e-mail request and could be helpful for other educators in economic and management schools interested in improvement of logistics and SCM skills through games. The interested potential users can establish their own selection procedure of suitable games using this database as a starting point.

The selection procedure of suitable games is designed to meet specific requirements of Business Logistics and Supply Chain Management courses at the FOS. The main constraints were related to the costs and two criteria to exclude games were made: games with zero costs and institution's costs for using games below $250. Free games for students are an important criterion because it would be very unrealistic to ask Serbian students to pay for using games. These criteria related to the costs can be used by other teachers, lecturers and instructors who work in developing countries. In the third step of selection procedure, the developed game suitability indicator is used. It presents the combined weighting of functionality, simplicity, duration and ease of game setup. Potential users can adapt this game suitability indicator according to the needs of their courses, or they can apply some other methods for assessment of game suitability, such as Analytic Hierarchy Process (AHP), Analytic Network Process (ANP) etc.

During the summer semester of 2010/2011 and the winter semester of 2011/2012, the Business Logistics and Supply Chain Management courses were attended by a relatively small number of students (the total of 24-27 per class time), which was caused by the same small number of students that decide to study at the Operations Management program. This is one of the main limitations of this research. However, in the next years we expect more interested students for these studies.

The comparison of post-game evaluation results between different generations of students was not provided. Therefore, to make this possible, the same Likert-type questionnaires will be used for the next generation of students. The interested teachers, lecturers and/or instructors from other economic and management schools can use these questionnaires and compare the results with the results of this research, or they can develop new post-game questionnaires for the purposes of their evaluation.

5. Conclusion. As complexities have increased in the global business and as the struggle against the economic crisis is still ongoing, the valuable business logistics and SCM skills are required more (Corsi et al., 2006). GBL offers opportunities to improve logistics and SCM skills of future economists and managers, as well as of existing ones who want to improve their problem-solving effectiveness and competences. There are numerous logistics and SCM games that can be employed and educators ready to change their role from a teacher to an enabler of the learning process (Chwif and Barretto, 2003; Deshpande and Huang, 2011) are faced with the issue of selecting the most suitable games for their requirements.

At the Faculty of Organizational Sciences, the decision was made to use a combination of GBL and face-to-face learning in Business Logistics and Supply Chain Management courses. The database of existing logistics and SCM games has been

created and this database is available for interested educators from other economic and management schools. Furthermore, the developed procedure of selection of low-cost and suitable games and the method of game evaluation can be adapted for specific purposes of various courses in the field of business logistics and supply chain management. In future, the intention is to continue with improvement of the methods of development business logistics and supply chain management skills at the FOS and with transfer of experience to other economic and management schools.

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