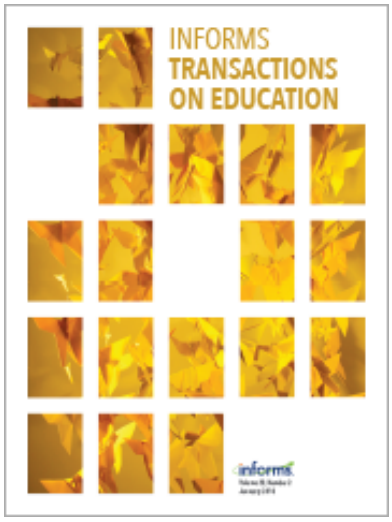

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An Educational Game with *Dragons' Den* Experiences for Supply Chain Management Training

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Abstract. This article presents an educational game to engage university and industrial stakeholders in collaborative training for supply chain management courses. The game will help students learn complex supply chain management issues. There are two integrated parts: a case ethod through an industrial case and an activity-based game featuring role plays based on international television shows such as *Dragons' Den* in Canada or *Shark Tank* in the United States. We developed a game framework to illustrate how the game can be prepared and played in classrooms. Although the game is primarily developed for classroom teaching, it may be adapted to other training environments. We have provided two examples to demonstrate how the game can be played as a short game in conference environments. Game experiences and feedback are presented with comments from various game participants. By interacting with stakeholders and tackling a real-world business case, students can better understand stakeholders' business goals, the importance of supply chain collaboration, and the impacts on supply chain decisions.

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Keywords: supply chain management teaching • educational game • integrated game and case method • activity-based learning • university-industry collaboration

1. Introduction

Supply chain management has been recognized as one of the key management approaches that significantly contributes to companies' business competitiveness (Snyder and Shen 2011, Stadtler et al. 2015, D'Amours et al. 2016). Training university students in supply chain management field to meet industrial needs, however, is a challenging task. Supply chain management not only covers a broad range of management knowledge and decision-making methodologies from long-term strategies to short-term operations but also involves many business entities and stakeholders. Supply chain coordination among different entities within a firm and among different companies, such as suppliers, manufacturers, clients, and logistics service providers constitutes other important supply chain management aspects. In multistakeholder environments, any decisions made by one stakeholder can have substantial impacts on the others. The classical supply chain management teaching method, based on textbooks and teachers' expertise, is important for teaching theoretical knowledge and methodologies. However, there is a large gap between theoretical teaching and business practice. Students often find it hard to understand how supply chain management knowledge can be applied in real-world business environments. Industry stakeholders often question how theoretical knowledge can make a significant difference and create values for their businesses. This article addresses the feasibility of university and industry collaborative training in supply chain management classes to enhance student learning. Specifically, we propose an educational game featuring role plays and stakeholder involvements played in classrooms while solving real-world business problems. We refer to this educational game as the "reality game."

We based our reality game on the *Dragons' Den* and *Shark Tank* reality television shows. The game presented in this article, however, differs from the television shows in many ways. First, unlike the television

shows, featuring business leaders as dragons who primarily seek financial gains, the dragons in our game consist of invited stakeholders from private and public sectors. These stakeholders may have different goals and interests; consequently, their decisions may vary and sometimes conflict with others. Second, instead of various entrepreneurs presenting different business scenarios, a single industrial scenario (case) is provided to the "consultant" teams who are performed by students. Third, the competition requires all consultant teams to deliver the same deliverables, that is, new business proposals for the same case. Furthermore, the game is designed for educational and training purposes. Participants are university students and invited stakeholders.

This reality game differs from the other educational games currently used in business and management courses. To date, computerized or activity-based educational games are mostly based on simplified business models. Although these games create a stimulating learning environment for students, they cannot provide training for other important aspects such as critical thinking, analysis, and problem solving. In the reality game, a case method is incorporated through an industrial case. Critical thinking, analysis, and problem solving through teamwork are essential components of the game requirement. By involving stakeholders in the game, students acquire more knowledge from stakeholders while experiencing dragons' den challenges and having fun.

This article presents the reality game through a framework divided into three main parts: goals, game design, and game execution. Primarily designed for classroom teaching, the game may be adapted to other training environments. Examples are provided with the game in conference settings. We received positive feedback from students, dragons, and university faculty members. The article is structured as follows. In Section 2, we review the literature based on relevant educational games found to date. In Section 3, we present the game framework describing the key elements of game design and game execution. In Section 4, we explain how the game can be prepared and played using two examples. In Section 5, we provide game feedback and present discussions with experiences before delivering concluding remarks in Section 6.

2. Literature Review

Educational games, in a broad sense, can be defined as activities designed to mimic the external world realities within a classroom setting using board games, computer-based games, role plays, and exercises that allow students to learn by experimenting alternative ideas in a risk-free environment (Tan 2007). The effectiveness and importance of using educational games in teaching management science (MS) and operations research (OR) courses were discussed by Griffin (2007) and Ben-Zvi and Carton (2007). The dynamic and interactive nature have made educational games ideal tools for teaching complex business knowledge in a stimulant classroom environment. The "Beer Game," developed at MIT and widely used in business schools for teaching supply chain management courses, is the best example (Sterman 1984). By simulating a beer supply chain case with role plays, players can experience the impacts of bullwhip effects and develop a deeper understanding of the importance of information sharing among supply chain partners. D'Amours et al. (2017) presented an online "Wood Supply Game" adapted from "Beer Game." Two divergent and interdependent lumber and pulp and paper supply chains were simulated for teaching supply chain management courses in the forest industry sector. Holweg and Bicheno (2002) presented a "Lean Leap Logistics Game" developed for the steel manufacturing system to raise supply chain awareness and foster collaboration among miscellaneous activities in the manufacturing process. Wood (2007) presented a web-based, real-time production game in which teams compete in running a plant and making capacity decisions. Arunachalam and Sadeh (2005) described a "Supply Chain Management Trading Agent" competition game for making supply chain bidding, sourcing, and procurement decisions in an electronic device assembling supply chain environment. Fawcett and McCarter (2006) developed a "Supply Chain Puzzle Game" to demonstrate the behavioral issues in supply chain coordination. Drake and Mawhinney (2006) presented a Lego-based game to illustrate the benefits of cooperation in supply chains. Fjeld and Hedlinger (2005) developed a board and score cards-based transport game to introduce students to the important issues in forest transportation planning. Abasian et al. (2016) extended Field and Hedlinger's work and presented a web-based transportation game allowing students to learn the dynamics of wood purchasing and transportation planning. D'Amours and Rönnqvist (2010) presented a collaborative logistics game based on an award-winning application in forest transportation collaboration to teach the major concepts of negotiation, benefit sharing, and coalition for effective collaboration. Activity-based games, used as an alternative game method, were studied by Gray (2011) and Wright (2015). In Gray (2011), a course-long activity-based game was introduced. Teams of four or five students were required to design a simple product and process. The students then worked on improving the production process and presented their works at the end of the course. In Wright (2015), a similar course-long activity-based game, referred as the "Zu Zitter Game,"

was used. Student teams were provided with the materials and were required to oversee all aspects of operations management, including process design and layout, capacity planning, inventory management, lean manufacturing, process improvement, and quality management and control. Then, student teams competed against each other to develop the process for the same product. Several advantages of using educational games were reported by Tan (2007), including their dynamics and interactive abilities to create a stimulating learning environment, making students' learning more interesting. However, because most developed games are based on the simplified versions of realities, they rarely represent the real business situation. In addition, the game approach appears to lack the effectiveness in training students' critical thinking, analysis, and problem-solving abilities (Tan 2007).

Educational games based on real industrial cases to incorporate case method as learning tools for teaching supply chain management or operations management courses are scarce. Historically, game and case method were treated as two separate approaches. The case method is more student-centered. It encourages students to work on more complex, ambiguous, and sometimes real-world problems to develop critical thinking, time management, communication, and teamwork skills. Like decision makers in real-life situations, students are required to incorporate their knowledge and experiences to search and evaluate information from various sources and deliver the best results possible (Schwartz 2002). Institutions such as the Harvard Business School have been using the case method since the 1900s. More recently, Yeoman and McMahon-Beattie (2004) presented a series of cases for revenue management teaching, focusing on airlines, hotels, and manufacturing industries. Keller and Bayraksan (2012) applied the case method in risk management teaching for the banking industry. Talebian and van Ryzin (2014) presented a case method addressing the retail industry markdown management. In addition to business school teaching, the case method has been adapted to engineering classes (Raju and Sanker 1999) and materials science courses (Davis and Wilcock 2003). Whereas the case method reaps many advantages in training students with more intellectual abilities, it faces a major disadvantage: Students cannot experiment their ideas and learn from the consequences of their decisions (Tan 2007).

Although combining educational game and case method seems to be the best option, there is only one such contribution found to date and that is by Li and Baillie (1993). In this literature, the authors studied the effectiveness of applying simple and complex computerized business games as supplements to the case method in a business policy course, a practice that differs from the reality game proposed in this article. The educational game we present in this article contributes uniquely to the scientific community.

3. Reality Game

The reality game is an activity-based game. It includes a case method and student and stakeholder participated role plays in a classroom setting for supply chain management course or other similar courses such as operations management, or transportation and logistics. Working in teams representing consultant teams or firms, students will apply the supply chain management knowledge learned in class to develop business proposals for new business development, new supply chain designs, existing business improvements, or mixed strategies. Each team must deliver a business proposal and present it to the dragons, performed by real stakeholders, to win their investments. The team that receives the most investments from the most dragons wins the game. Figure 1 outlines the game's goals, game design, and game execution.

The game design consists of three major tasks: developing the case, designing the roles, and establishing the rules. A game schedule and process are required for game execution. The game schedule ensures that the game is aligned with the course schedule and the game activities are coordinated among players, while the game process describes how the game should be played.

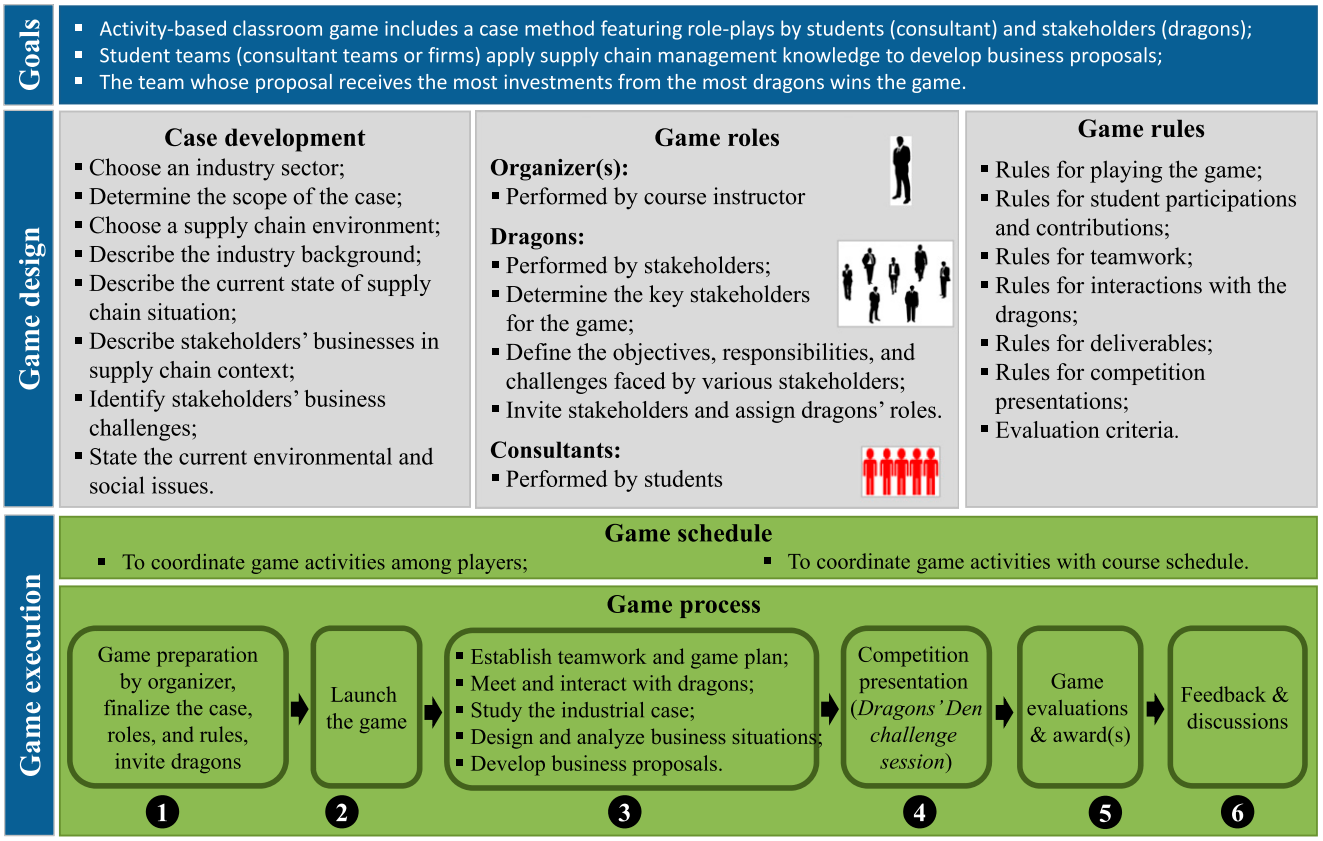
The game duration may vary. It may last for a semester in parallel with the teaching, half a semester, or a few days as an end-of-course competition. The scope of the case, deliverable requirements, and the game process will therefore differ depending on the game's duration. These aspects should be considered at the game design stage. We describe the game framework in detail in the following subsections.

3.1. Case Development

The case may be developed in any industrial sector such as forest, agriculture, mining, and high-tech and in any country. We recommend, however, that the industrial sector be selected in accordance with the instructor's expertise and possibly having established collaboration partnership. The case may be based on a previous research case or current industrial issues. By engaging industrial partners in the game and training students to solve their real industrial problems, connections between partners and students can be built to set up extended internship projects or create new research projects.

The scope of the case should be enough to include various supply chain issues, appropriate for the game's duration, and challenging enough for the student team competition. Once the scope of the supply chain

Figure 1. Reality Game Framework



problem is determined, the industrial background should be described. This description should cover the business activities of the suppliers, manufacturers, logistics providers, and customers, and their business relationships. The market, business environment, and the flows of goods, information, and transactions should also be described. Most companies face many challenges such as market competitions, logistics system efficiencies, manufacturing constraints, supply uncertainties, and new business risks. The problems become more challenging when many stakeholders, with different and often conflicting interests, are in the business environment. Stakeholders may include customers and suppliers, provincial and federal governments, financial institutions, universities, research organizations, and local communities. The relationships between these stakeholders and their influences on the business decisions should be described. The current industrial supply chain activities as well as the potential opportunities for supply chain collaboration and optimization should be implied, encouraging students to think beyond the traditional business models. The importance of environmental sustainability and social responsibilities should be stated in the case to draw students' awareness of various business challenges.

The level of challenge for the game depends strongly on the scope of the case, complexities of the stakeholder relationships, level of information provided, and the data availabilities. A real industrial case with ambiguous arguments and little guiding opinions can make the game more challenging. Alternatively, a case with concise information, clear goals, and full data availabilities will make the game less challenging. Given the course objectives and student backgrounds, the instructor can adjust the scope and complexity of the case, and availabilities of information and data to adjust the game intensity. Table 1 provides a case development guideline. An example of the case is

Table 1. Case Development Guideline

No.	Case
i	Choose an industrial sector
ii	Select a level of challenge for the game and determine the scope of the case
iii	Choose a supply chain environment
iv	Describe the industrial background
v	Describe the current state of supply chain situation
vi	Describe stakeholders' businesses in a supply chain context
vii	Identify stakeholders' business challenges
viii	State the current environmental and social issues

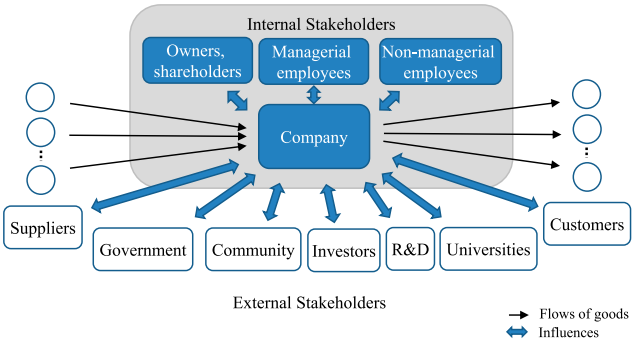
provided in Online Appendix A. Once the case is developed, it can be reused with minimal revisions.

3.2. Stakeholders

This section describes the kinds of stakeholders, their responsibilities, and interrelationships relevant to the generic multistakeholder industrial supply chain environment. Describing the stakeholder types will be of great help to the case development and dragon role designs. Students may benefit from the stakeholder descriptions to understand the complexities of the real business environment and be aware of the many stakeholder values.

A stakeholder refers to a person, organization, social group, or society that has a stake in the business and can affect or be affected by the business actions (Freeman and Reed 1983). Stakeholders can be classified as internal and external, as shown in Figure 2. Internal stakeholders refer to the owners, shareholders, managerial, and nonmanagerial employees having direct contributions to the company through monetary or nonmonetary means, such as knowledge, skills, and expertise. External stakeholders refer to the entities outside the company, including customers and suppliers, government agencies, external investors, research institutes, universities, and communities. Of these external stakeholders, some, such as customers and suppliers, have direct transactional relationships or financial ties with the company. Thus, they have mutually correlated economic interests. Others do not have transactional connections but may influence business decisions by policies, regulations, knowledge, and technologies such as government agencies, research institutes, and universities. Still, others, such as local communities, have little influence on business decisions but are affected by them. According to the stakeholder theory, business decisions should not only address the needs of the internal stakeholders focusing on financial gains but also consider the values and interests of other stakeholders, including environmental and social impacts (Miles 2012). Given these broad definitions, we describe each of the stakeholders as follows.

Figure 2. Internal and External Stakeholders in a Business Environment



3.2.1. Internal Stakeholders. Each organization has internal stakeholders who generally have the same or similar goals and interests. These stakeholders seek to grow business, create values for the business owners, shareholders, and investors, and provide jobs for employees. Consequently, decision makers have a responsibility to effectively utilize the funds and resources to capture business opportunities, improve products, processes, technologies, and services to increase the company's competitiveness. They also have a responsibility to manage and coordinate resources to ensure business activities are carried out and business objectives are achieved. But these management decisions are often affected by many influential factors from external stakeholders, such as customers, suppliers, partners, and competitors. These stakeholders often have different and conflictual interests. In addition, the management decisions must respect local and federal government policy regulations related to the industry, taxes, and environment, to name but a few. Furthermore, the companies have moral responsibilities toward local communities.

3.2.2. Customers/Suppliers. Each customer or supplier is an individual business entity with its own internal stakeholders and business objectives. Management decisions are therefore focused on the best interests of its own business to achieve goals. From a supply chain point of view, a customer or a supplier may play different roles at the same time. A sawmill, for instance, may be a customer because it purchases timber from forest owners, and a supplier because it supplies chips to pulp and paper mills and lumber to distributors and retailers. Additionally, the sawmill may serve as an internal customer for some forest owners and/or an internal supplier for some pulp and paper mills, depending on the ownerships, but external customer/supplier for others. The sawmill might also be a partner with some forest owners and/or pulp and paper mills or serve as a competitor competing with other sawmills. Depending on the roles played, the customer/supplier's decisions will differ.

3.2.3. Government. Stakeholders in this category represent policy makers at the federal and provincial governments. These stakeholders set policies and regulations to govern national, provincial, and regional economic developments, industrial activities, import and export trades, energy strategies, environmental protections, and social and ecological wellbeing. Under provincial government jurisdictions, stakeholders manage resources, such as forest resources and mining,

to develop policies for industrial uses and resource regenerations and conservations. Some of the stakeholder objectives include developing policies, legislations, and regulations to facilitate economic growth, steer technology transformations, optimize resource management, and support social and environmental protections. Government policies may impose various influences on business strategies and research developments, substantially affecting industrial dynamics. Therefore, government stakeholders must act prudently to determine the policies and programs that best utilize the taxpayers' money to address key industrial economic, environmental, and social issues.

3.2.4. Local Community. This stakeholder represents social groups whose state of interests and living environment may be affected by the business activities. The stakeholder is responsible for protecting the common interests of the local community. Typical community interests include economic, environmental, social, ecological, and recreational requirements. The stakeholder's objectives, among others, are to ensure that the residents' employment status, living environment, and living standards are not affected or deteriorated. However, business changes can have significant impacts on the local community. Industrial transformations and new technology adoptions can result in old mill closures and/or new mill openings, resulting in job changes and skill set shifts that may affect the local employment. Industrial expansion and new capacity installation may result in excessive resource uses and emissions causing environmental changes. Whenever economic benefits and environmental impacts are in a conflictual situation, the pure economic model must be challenged. In addition to job creation and economic growth, the community stakeholder must voice concerns regarding the potential impacts on the environment, air, water, natural resources, and ecological wellbeing before supporting or opposing any new business decisions.

3.2.5. Investors. Investors refer to the third-party independent financial stakeholders or potential stakeholders whose funds can be used to support the company in purchasing new facilities, expanding businesses, and acquiring new technologies and resources. This financial support increases the company's manufacturing capacities, improves efficiencies, accesses new business areas, and extends product portfolios to increase market shares and profits. The investors' objective is to maximize the returns on their investments. The investors' decisions may be influenced by government policies and research developments, through which proven technologies can reduce investment risks and increase returns. In a business environment, investor investments often face uncertainties and high risks. To mitigate the risks, investors may choose to pool their investments with other investors, government funding agencies, and industrial owners.

3.2.6. R&D Institutes. Typically, research institutes are nonprofit organizations. The institutes' business objectives are to develop scientific solutions, technology innovations, new products, processes, and services to support industrial members. These stakeholders may influence industries through research and development to support new business opportunities, decision optimizations, manufacturing system improvements, cost reductions, and profit maximizations. In addition to nationwide research programs, research institutes can also provide technical and problem-solving services to individual members. Most research institutes are funded by government bodies and industrial members. As a result, research programs are strongly influenced by government policies and industrial member needs.

3.2.7. Universities. Universities are entities that provide higher education programs to train future engineers, researchers, business leaders, and policy makers with the required knowledge and skills. Universities support industries through collaborative research to apply new knowledge, methodologies, and technologies in real business environments to create values. In addition to teaching fundamental knowledge, universities conduct government-funded research to support provincial and regional development in public and private sectors. University research is strongly influenced by government policies and industrial needs. Consequently, collaborations with research institutes and industrial partners are crucial.

Table 2 summarizes the main stakeholders, their responsibilities, objectives, and pertinent challenges faced in the decision-making process.

3.3. Game Roles

The game has three distinct roles: the organizer, dragons, and consultants, as shown in Figure 1. We describe these roles, their responsibilities, and assignments as follows.

The course instructor usually organizes the game, though the course assistant may sometimes assume the role. The organizer designs and prepares the game, organizes and monitors the game, facilitates student-dragon interactions, and chairs the dragons' den competition. To guarantee that the game design falls in line with course objectives and teaching materials, the game should be prepared before scheduling the course. As described in Section 3.1, game design includes developing or selecting a case and

Table 2. Summary of Stakeholder Responsibilities, Objectives, and Pertinent Challenges Faced in the Decision-Making Process

Stakeholders	Responsibilities	Objectives	Challenges
Internal stakeholders (decision makers)	Make business decisions and manage finances, investments, resources, and business operations to produce products and services that satisfy market needs	Create values for business owners, shareholders, and investors, and provide jobs for employees	What new business model should be considered? What new investment strategy should be adopted? What are the benefits of a new investment? How does it impact the existing supply chain? What would happen if nothing is done? How is the company's supply chain designed? How could the company's competitiveness be improved?
Customers/suppliers (decision makers)	Make business decisions in the best interests of the customers/ suppliers' companies	Create values for the customers'/ suppliers' companies	What new business opportunities should customers/suppliers consider? What new investment strategy should customers/suppliers adopt? How should the customer/supplier companies' supply chain be designed or integrated? How could the customer/supplier companies' competitiveness be improved?
Government (policy makers)	Make policies to govern national, provincial, and regional economic developments, industrial activities, trades, resource management, energy strategies, social, ecological, and environmental protections	Develop policies, regulations, and programs to facilitate economic growth, steer technology and industry transformations, regulate resource uses, and protect environment and community	How could policies and stimulus programs be designed to facilitate economic growth, create jobs, and mitigate environmental impacts? What programs should be created to support the industrial transformations? What tax credits should be introduced to effectively mitigate environmental impacts? What are the short-, middle-, and long-term benefits of the policies? What are their risks and impacts?
Local community (board members)	Protect the local community, employment, living environment, and living standard	Ensure that residents' employment status, living environment, and living standard remain unaffected	Have industrial strategies and government policies considered the impacts on the local community? What are the benefits for and impacts on the community? What are the compensation plans for the local community?
Investors	Identify investment opportunities and make investments	Maximize the return on investment while mitigating risks	Is it the right time to make an investment? With which company should the investment be made? What are the potential investment returns and risks?
R&D institutes (decision makers)	Develop scientific solutions for technology, product, and process innovations, support technology transfers, and provide problem-solving services	Support industrial members in advancing technologies, improving efficiencies, reducing costs, and increasing profit	What are the industry needs and government policies? What front-end technologies, products, and services should be developed? What decision support tools should be developed and commercialized? How can research developments be transferred? Are the markets ready for the new products and technologies? What are the benefits and risks of, and impacts on these new developments?
Universities (faculty members)	Train students to become future engineers, researchers, business leaders, and policy makers with required knowledge and skills	Support industries, R&D institutes, and governments by training students with the latest knowledge, methodologies, and technologies	What are the knowledge and skill sets required by the industrial, research, and government stakeholders? How could we collaborate with these stakeholders to train students with the supply chain management knowledge and skills to solve real industrial problems? How could supply chain management knowledge and decision support tools create values and improve company competitiveness?

assigning roles to dragons and consultants. Finally, the organizer enforces the rules and develops the game schedule and game process (to be described in the subsections below).

Dragons should be played by real stakeholders such as managers, engineers, researchers, financial advisors, and faculty members. The stakeholders impart their industrial and business knowledge and perspectives to students, share their experiences, and provide critical comments and feedback during the game. Depending on the number of dragons in each case, the organizer should identify, assign, and invite stakeholders from his/her contact or collaborators' list. When assigning a dragon's role to a stakeholder, the organizer must consider the stakeholder's availability and relevant experiences. The organizer may plan parallel events with the stakeholders, such as a project review meeting or a department seminar, to make their game participations more accessible. If one of the stakeholders is unavailable, the organizer may invite another stakeholder with similar experiences. For example, if a manager from one organization is unavailable, the organizer may invite one from another organization, a retired one, or a faculty member who has previous industrial experience to play the role of an industrial decision maker. Stakeholders may perform more than one role. For instance, a faculty member could perform the roles of university, research, and/or community stakeholders. Stakeholders' participation in the final competition presentation session is particularly crucial, for students can experience the dragons' den challenges. In other dragon-student meetings and interactions, unavailable stakeholders may participate the meetings through conference calls. Once the candidate stakeholders are identified, the organizer should send invitations. The invitations should include the stakeholders' assigned roles and required involvements. Once the invitations have been accepted, the organizer should send the game document, containing all the necessary information, to the stakeholders. Stakeholders should familiarize themselves with the game and adapt their real-life experiences and creativity to enrich their roles and make the students' learning process more enjoyable.

Students will play the role of consultants. Working in teams, students will develop and present their business proposals to the dragons to win their investments. Depending on the number of students in a class, teams may be comprised of three to eight members. Team size should be suitable for teamwork, allowing each student to join discussions, contribute ideas, and carry out required tasks. Team size will affect the total number of teams; therefore, size should be appropriate, so that the final competition presentation session can be completed within the designated class session. Having determined the number and size of the teams, the organizer may assign team members or let students form their own teams. A team leader should be nominated after each team is formed to lead and coordinate teamwork, schedule meetings, and manage their tasks. As consultants, students are required to show professionalism and autonomy as much as possible. Their objectives are to develop business proposals for the industrial case and present them to the dragons to win their investments. The business proposals will be developed through three deliverables, which are described in the next section.

3.4. Game Rules

This section outlines game rules, required deliverables, and evaluation criteria. We classify the rules in three major categories based on a course-long game setting. These rules pertain to game participation, deliverables, and competition presentations. Rules may be adjusted for different game settings.

3.4.1. Rules for Game Participation. The game should be compulsory, for it will require students' full participation including team meetings, dragon interactions, contributing to develop business proposals, and presenting proposals to the dragons. Each team member should contribute their ideas, share information, and share the workload. Game participation may be included in the course evaluation.

3.4.2. Rules for Deliverables. Each team must develop a business proposal for the case. In the context of a course-long game, the business proposal will be developed through three deliverables. These deliverables and suggested contents are outlined in Table 3, each providing a guideline for students to develop their business proposals and allow the organizer to track game progress. All teams must submit their deliverables on time. Toward the end of the game, the student teams must synthesize their business proposals and present them to the dragons during the competition presentation.

3.4.3. Rules for Competition Presentations. The competition presentation will be held during a class session. Punctuality and participation are essential. To highlight team effort, the entire team or a minimum of two members may deliver the presentation. Each team presentation is followed by a question-and-answer session, during which dragons take turns asking critical questions. Only team members presenting the business proposal can answer the questions. A time restriction on the presentation and question-and-answer session may be imposed to ensure all team presentations are made within the class

Table 3. Example of Required Game Deliverables

Deliverables	Suggested contents
Deliverable 1	Describe team skills, provide teamwork plan, including anticipated tasks, expected completion dates, milestones, persons responsible for the tasks, and team meeting schedules (maximum 3 pages).
Deliverable 2	Describe current supply chain issues, provide case analysis including market analysis, manufacturing operation and resource analysis, supply chain logistics and flow analysis, supply analysis, stakeholder analysis, and propose new business or business improvement strategies. Write a report with an executive summary and an updated teamwork plan (maximum 10 pages).
Deliverable 3	Develop business proposal, detailing the proposed ideas, new supply chain design or logistics system design, budget and justifications, expected economic returns, social and environmental evaluations, implementation plans, potential impacts, risks, and risk mitigation strategies. Write a report with an executive summary (maximum 10 pages).
Competition	Synthesize the business proposal, prepare a presentation for the dragon jury to win their investments (maximum 10 slides).

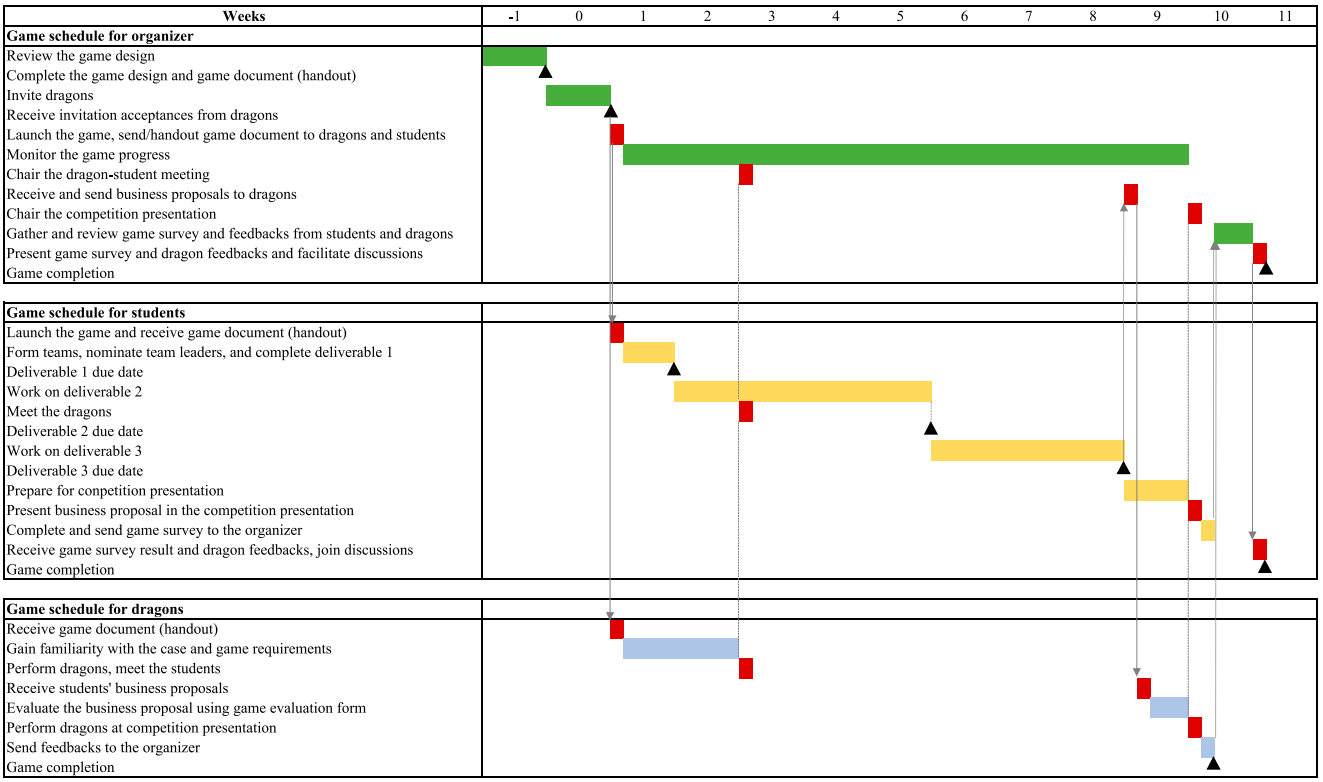
session. Time restriction may be determined by the number of team presentations and class session length, all the while considering the durations of the game evaluation and winner announcements.

3.4.4. Game Evaluation Criteria. Game evaluation should be different from course evaluation. The former should be conducted by dragons, for it evaluates the quality and feasibility of the business proposal from a stakeholder's point of view. The latter, however, should be conducted by the course instructor and be based on course evaluation criteria. Course evaluation may include the game evaluation, considering the dragons' comments. Suggested game evaluation criteria may include but is not limited to (i) the scope, novelty, and feasibility of the business proposal; (ii) the evidence and quality of supporting analyses and justifications; (iii) the economic values and social and environmental considerations; and (iv) the overall quality and clarity of the business proposal and presentation.

3.5. Game Schedule and Process

To ensure a successful game execution, game schedule and game process are required. The former provides a coordinated timeline with key tasks and milestones, ensuring game progresses and aligns with the course schedule. An example of the course-long game schedule is presented in Figure 3. The later describes how the game should be played by different players. To ensure proper game preparation before starting,

Figure 3. Example of the Game Schedule for a Course-Long Game



we have included a pregame phase called "game preparation", as shown in Figure 1. This section describes the game process in accordance with the game schedule. Shorter games may be played with a shorter process. Depending on the game requirement, some phases may be removed or combined; the duration of each phase may be shortened. Such games are illustrated in Section 4.

Phase I: Game Preparation (Before Week 1). Game preparation must be completed before the course starts, as shown in Figure 3. If the organizer is preparing the game for the first time, game preparation may begin earlier, particularly when a new case needs to be developed. By the end of this phase, the case should be developed, or an existing case be selected. Game objectives, roles, and rules, including the required deliverables, are determined. Game schedule and game process should be developed in line with the course schedule. A game document containing all relevant information should be prepared in the form of a handout. Invitations should be sent to the stakeholders and their acceptances should be received by the organizer. Then, a game document should be sent to the stakeholders, and the size and number of student teams should be determined. Once these steps have been followed, the game should be ready to launch.

Phase II: Game Launch (Week 1). The organizer should launch the game in class, providing students with a game and dragon introduction. At the same time, the organizer should highlight the game objectives and rules. The game schedule should be presented, and the game process should be described. The organizer should then hand out a game document to each student. Alternatively, the document should be uploaded to the online course portal. As consultants, students should act effectively and professionally to familiarize themselves with the game document, form teams, and nominate team leaders. A team meeting should be subsequently organized to introduce the team members, share ideas, and discuss game strategies. Meeting the organizer or course assistant to seek advice is possible through appointment.

Phase III: Meeting with Dragons and Developing Business Proposals (Week 1–8). The third phase is most crucial, when students interacting with the dragons and developing business proposals take place. To make the dragons' involvements more meaningful and efficient, it is recommended to organize the first meeting with the dragons in class during the third or the fourth week (see game schedule, Figure 3). This will allow dragons to answer common questions from all student teams. The timing of this student-dragon meeting is suggested so that students would have time to familiarize themselves with the case, initialize the case supply chain analysis, brainstorm various ideas, and prepare questions before meeting the dragons. Several dragons may be invited to the same session to create synergy. They may begin their presentations by introducing themselves and their organizations and open the floor for questions from students. More than one dragon may answer students' questions. Dragons unable to participate in person may join the session through conference calls or at a later date. Team leaders may organize short, individual team meetings with dragons, subject to their availabilities, to discuss team-specific ideas.

To develop business proposals, student teams should study the case, understand the stakeholders' requirements, and apply supply chain management knowledge to the industrial case. They should use appropriate methodologies and suitable analysis tools to develop and evaluate their business proposals. They should be responsible for searching additional internal and external data to support their analyses, designs, and evaluations. The business proposal should be realistic and feasible. It should include detailed descriptions, budget justifications, financial analysis, and risk-benefit analysis along with detailed action plans and implementation procedures. Regular team meetings are recommended to review teamwork progress, revise working plans, and coordinate resources to ensure the deliverables can be completed on time.

The quality of the business proposal depends on the overall requirements, students' creativity, and game duration. The organizer may provide a list of questions to stimulate students' thinking process. These questions may be as follows:

i. What is the current supply chain system?
ii. What is the current business model?
iii. What are the current market, manufacturing, logistics, and supply situations?
iv. What are the government policies and regulations affecting business decisions?
v. Which funding programs provide opportunities for business development?
vi. What are the current relationships between the stakeholders?
vii. What would happen if companies do nothing?
viii. What is your business proposal?
ix. What changes will be required to the current facilities, logistics systems, and supply chain?
x. How will you design the new supply chain?
xi. What are the investment costs, expected returns, and risks?
xii. What are the environmental and social impacts?

xiii. What are your strategies to mitigate the investment risks and reduce environmental and social impacts?

xiv. What are the implementation plans and proposed milestones over the next ten years?

The organizer may also provide a tutorial session to teach students how to write a professional business proposal and prepare a business presentation for the dragons.

Phase IV: Competition Presentation (Dragons' Den Challenge) Session (Week 9–10). Once business proposals have been developed, student teams should develop strategies to present their business proposals to win dragons' investments during the competition presentation. Teams have one week to synthesize their ideas on slides and prepare their presentations.

On the day of the competition presentation, students must be punctual. The competition is chaired by the organizer and judged by the dragons. Dragons should have received the team business proposals and made preliminary evaluations using the evaluation form as shown in Online Appendix B. The competition starts by welcoming the dragons and consultant teams. The dragons will be seated in the front row. Each dragon is given a specific amount of "investment money" according to the nature of their business. The dragons determine the presentation sequence by a series of random draws. The presentation must be made by at least two team members. They have limited time to present their business proposal. The organizer reserves the right to stop the presentation as soon as the designated time is reached. Upon finishing the presentation, dragons take turns asking questions. Following the question-and-answer session, dragons make investment decisions. Dragons can make more than one investment within their funding limit. Alternatively, a dragon may team up with others to make a joint investment. Once the dragon's investment decision is made, a "check" is issued to the student team. Dragons' investment decisions cannot be altered later nor can they wait and make an investment later for a previous team. The presentation proceeds following the next dragon's random draw. After all the presentations are completed and dragons' investments have been made, students leave the room. Dragons undergo a game evaluation to determine the winners.

Phase V: Game Evaluation (Week 10, During the Competition Presentation). During the game evaluation, dragons share their opinions and reach evaluation consensus. After dragon evaluations are made, the students return to the room. Dragons announce the winners.

Three prizes are awarded for the course-long game:

1. *Highest investment prize*, given to the team that wins the highest investment amount;
2. *Most investments prize*, awarded to the team that wins investments from the greatest number of dragons; and
3. *Overall excellence prize*, awarded to the team that receives the highest overall ranking based on dragons' evaluations.

The winner(s) of the first two prizes may be determined by the dragons' investments during the competition presentation. The third prize, however, is determined by the dragons' group evaluations that combine the written proposal with the oral presentation, per the game evaluation criteria. This prize is awarded to the team that demonstrates innovative, comprehensive, and high-quality works with overall excellence. The winner may or may not have won the highest or the most investment prize.

Phase VI: Game Feedback and Discussions (Week 11). When the game is over, students are required to fill out a game survey and send it to the organizer (Figure 3). An example of the survey form may be found in Online Appendix C. Dragons are required to complete their evaluation forms, provide feedback, and send them to the organizer. The organizer synthesizes student survey results and dragons' feedback; both are presented in the following class. This feedback is crucial for the organizer, as the organizer will look for opportunities to improve future games. It is also beneficial for students, as they identify their strengths and weaknesses and understand the stakeholders' expectations.

4. Examples

Although the reality game has been developed for a course-long classroom setting, it may be played as a short game, tailored to other environments. In this section, we present two examples where the game was played successfully in different conference environments. In a conference environment, game organization is more challenging because the duration is short (typically two or three days). Students participating in the game may come from different universities, possibly study in different disciplines, and possess different knowledge and background sets. Depending on the conference, inviting stakeholders to participate in the conference while performing dragons is another challenge. To incorporate the game in a conference environment, it is important that the game design be integrated with the conference program, and the game activity be carefully planned to ensure the game can be completed and game objectives can be achieved.

Example 1. In this example, the game was played by graduate students during a two-day national research network conference. It was aimed at supporting the research network conference, creating synergies for collaborative research, and fostering the dissemination of supply chain management knowledge in the forest industry sector. The industrial case was adapted from Elleuch et al. (2012) based on the Canadian forest industry in a Quebec region. Forest industry is one of the major industries in Canada, contributing significantly to the country's economy and supporting more than 200 forest-dependent communities (Lindsay 2014). Because of global competitions and market decline for traditional forest products, the industry is facing many challenges. Meanwhile, new technologies emerge, creating many new business opportunities such as combined heat and power production, biorefining, and new-generation green products using renewable forest biomass. Several collaborative research projects have been developed between universities, industrial partners, governments, and a national research institute. The region described in the case, like many other remote regions, has vast forest resources. It has several forest management units, each with many forest zones managed by the provincial ministry of natural resources. The region has six sawmills and one pulp and paper mill, owned by three companies. These mills create hundreds of jobs and contribute significantly to the regional economy. To reduce the scope and complexity of the case, thereby more suitable for the short game, considerations of government policies were not required, and game deliverables were reduced. These adjustments simplified the game considerably. The industrial case used for the game is provided in the supplementary materials.

Two organizers managed the game and organized the conference. The game was designed in accordance with the conference program. Seven stakeholders were identified; hence seven dragons were invited. Three of the dragons were industrial partners performing the roles of decision makers for the three companies respectively; one was a provincial government partner in the role of a provincial government policy maker; one was a research institute partner in the role of a research institute stakeholder; and two dragons were university faculty members, playing the roles of local community and university stakeholders, respectively. Table 4 summarizes the invited dragon actors and their game roles. Three separate dragons were assigned to the three companies, respectively, allowing their distinct and possibly conflict business interests be represented. All dragons were invited conference guests, making it easy for students to work with them throughout the game.

Thirty-three highly qualified persons (HQPs) participated in the conference and game, including PhD and master students, postdoctoral research fellows, and research professionals from seventeen universities. The HQPs came from a variety of disciplines such as industrial, chemical, and mechanical engineering, mathematics and computer science, business, economics, forest and natural resource management, and wood science. Many of them had previous working experiences and various levels of supply chain management knowledge, which raised a series of challenges for the game. On the other hand, the various domain knowledge provided a unique opportunity for cross-disciplinary learning to enrich the game experience.

The organizers created five consultant teams, each including six or seven members representing multidisciplinary firm consultants. The master and PhD students, postdoctoral research fellows, and research professionals were mixed to ensure knowledge and skills were balanced among the teams as much as possible. Having designed the consultant teams, five coaches were invited. These coaches were faculty members from different universities with required expertise. They provided mentorship and advice to ensure that their teams started and finished the game successfully. These roles were proven essential for the short conference game, for they made the initial teamwork possible. Nevertheless, the coaches were not supposed to lead the teamwork or be involved in any tasks.

Although the game was confined within two days, HQPs received the game document and notified their team members and coaches one week before the game started. It was recommended that they familiarize

Table 4. Example of Dragon Actors and Their Game Roles

Dragons	Dragon actors	Game roles
Dragon 1	Industrial partner 1	Manager of company 1
Dragon 2	Industrial partner 2	Manager of company 2
Dragon 3	Industrial partner 3	Manager of company 3
Dragon 4	Provincial government partner	Manager of government agency
Dragon 5	Research institute partner	Manager of research institute
Dragon 6	Professor	Local community representative
Dragon 7	Professor	University professor

themselves with the case and become acquainted with their team members and coaches. For this game, the deliverables included a fifteen-minute presentation accompanied by a one-page executive summary. The executive summary provided concise information regarding the proposed business ideas, supporting arguments, budget, justifications, and action plans.

Following the opening keynote speeches on the first day of the conference, the game was officially launched. Each team was allocated a private meeting room where the team met and worked. The coach facilitated the first meeting, during which a round table introduction was made and a team leader (captain) was selected. Team discussions were carried out to share ideas, discuss strategies, and develop working plans. The captain then led subsequent discussions, coordinated the tasks, and communicated with the organizers. Further, each captain received three tickets from the organizers, allowing teams to discuss their business ideas with one of the dragons for fifteen minutes during the first day and before the cut-off time on the second day. When the cut-off time arrived, each team handed in the one-page executive summary. The game then proceeded to the competition presentation that took place during the final conference session. The dragons were welcomed and seated in the first row of the conference hall. Each dragon was provided a copy of the student executive summaries and an evaluation form. The dragons determined team presentation sequence by a series of random draws. Following each team presentation, a two-round of fifteen-minute question-and-answer periods took place. Dragons asked critical questions; team members who presented the business proposal answered the questions. The dragons' monetary investments were omitted due to the short competition session. Game evaluation was conducted by the dragons after the competition presentation session. During the end-of-conference reception dinner, the winner announcement was made. Three finalists were announced; one winning team was awarded with a certificate issued by the national research network chair. A popular prize was introduced to allow the conference participants to vote. The team that received the most audience votes won the prize. The game generated many interests among the stakeholders. We received much feedback from the participants; most of the solicited feedback has improved the game. Feedback and discussions are presented in Section 5.

Example 2. This game was played during a three-day national multinetwork research conference. Graduate students (HQPs) from eight research networks participated in the game. These eight research networks supported a wide range of nationwide front-end research programs in the forest industry sector. The programs involved many new product developments such as innovative green fiber products, bioactive paper and packaging products, lignin-based chemicals and materials, ecofriendly lignocellulosic fiber-based products, and new-generation building products for nonresidential and midrise constructions. Some programs focused on new technology developments, process designs, and decision support tool developments. Examples of these research contributions included nanocrystalline cellulose extraction technologies, innovative bioconversion processes to produce fuel ethanol and biochemicals from lignocellulosic biomass, and advanced decision support models, algorithms, and prototypes to solve large complex business supply chain problems. The game activity was integrated into the conference program to create a stimulant and highly competitive event and to promote cross-network disseminations of the research developments. More specifically, the game was aimed at showing HQPs how their research developments could be commercialized and how supply chain management approach could be applied in the commercialization process to create values.

Four organizers prepared, coordinated, and managed the game. The same industrial case presented in Example 1 was selected for this conference game. To make the game more relevant to the multiresearch network environment and to better engage HQPs from different networks and backgrounds, several adjustments needed to be made during the game design stage. First, instead of an open game concept, allowing student teams to brainstorm different business opportunities, each team was assigned a specific business opportunity with a novel product developed by one of the research networks. Second, instead of student teams proposing supply chain designs for their own business ideas, students were required to propose a supply chain system for the specific team product. Third, the business proposal needed to focus on the successful commercialization strategies for the team product. The proposal needed to include the production system design, supply chain network design, facility and equipment investments, market penetrations, financial plans, and implementation plans. For this purpose, a new "product specialist" role was introduced. Each team was assigned a product specialist in line with the product assigned to the team. Typically, the product specialist was a postdoctoral research fellow or a PhD student whose research was specifically related to the novel product. The product specialist provided product-related knowledge and information to support the teamwork. Game deliverables were adjusted accordingly. At the end of the

game, each student team was required to submit a one-page executive summary and prepare a five-minute presentation that highlighted their business proposal to commercialize their special product.

In this game, eight dragons were required. Three of the dragons were industrial partners solicited to perform the role of three managing directors for three companies respectively. A retired bank CEO was invited to perform an independent domestic investor; an industrial partner, as a federal government stakeholder; a provincial government partner, as a provincial government policy maker; a consultant partner for the local community stakeholder; and a research institute partner performed both roles as a research institute manager and a university stakeholder. Table 5 lists all the dragon actors and their game roles. These dragons were also the invited conference guests.

Seventy-one HQPs participated in the game. Of the HQPs, 75% were PhD students, 16% master students, and 6% postdoctoral research fellows. Nine teams were created, each counting seven or eight members. Students from different research networks, universities, disciplines, and programs were mixed to create a cross-learning environment. Great efforts were made to ensure multidisciplinary knowledge and skills being evenly distributed among teams as much as possible. Nine coaches, made up of industrial partners, research scientists, and university researchers, were invited. These coaches provided valuable mentorship and guidance for the students.

The game document was sent to all game participants ten days prior to the conference. Students were notified their team members, coaches, and product specialists, and were recommended to familiarize themselves with the game and learn about their novel products before the game started. The game was launched on the first day of the conference, directly after the keynote speeches. An overview of the game was presented; the dragons were introduced; the game rules, deliverables, schedule, and process were described. After the game launched, student teams were assigned private meeting rooms. The game underwent a condensed process along with parallel conference sessions to encourage students to take part in various cross-network conference sessions. On the third day of the conference, the game competition presentation took place. All conference participants were audience members. Dragons were seated in the front row. Each team presentation was followed by a fifteen-minute question-and-answer session where dragons took turns asking questions. Three finalists were nominated; one winning team was awarded. A popular prize was also awarded to the team who received the most votes from the audience.

Throughout the game, stakeholders and conference participants not only learned about the research contributions from different research networks but also learned about the potential applications and commercialization values. We present the game feedback with discussions in the next section.

5. Game Feedback and Discussions

After each game, we received much feedback from students, dragons, and coaches through survey comments, conversations, and emails. Their feedback is provided in Online Appendix D. A game survey was carried out following the game played in Example 1. Twenty-nine out of 33 students submitted their survey responses, representing a response rate of 88%. Table 6 provides a summary of the survey results with average rating and standard deviation. The rating is based on 1–10 scores, where 1 represents full disagreement; 10, full agreement. Despite the short game durations, all teams completed their business proposals. Although the game was very challenging students said that the game was enjoyable because of the opportunities the game provided. Students enjoyed talking to the dragons with their tickets, and they were surprised by the quantity of details provided by the dragons during the interviews. Above all, students gained a better understanding of the supply chain management in the forest industry sector and employed critical thinking, analysis, time management, teamwork, task coordination, and communication skills. Many students wished that they had more time to play and speak to the dragons during

Table 5. Dragon Actors and Their Game Roles

Dragons	Dragon actors	Game roles
Dragon 1	Industrial partner 1	Managing director of company 1
Dragon 2	Industrial partner 2	Managing director of company 2
Dragon 3	Industrial partner 3	Managing director of company 3
Dragon 4	Retired financial institute CEO	Independent investor
Dragon 5	Industrial partner 4	Federal government
Dragon 6	Provincial government partner	Provincial government
Dragon 7	Consultant	Local community representative
Dragon 8	Research institute partner	Research institute and university

Table 6. Survey Results

	Statements	Scores (avg)	SD
1	The case is very broad and challenging	8.04	1.67
2	Instead of providing us all the data, we had the opportunity to learn how to collect data, make assumptions, and draw estimations	7.70	1.66
3	The game is appropriate for a team of 6–7 members to work on	8.07	1.92
4	The game is fun with dragons and tickets	8.26	1.56
5	Our coach was very helpful provided us valuable guidance	8.36	2.39
6	We had enough time to talk with the dragons	7.54	2.30
7	We really enjoyed talking with the dragons and learned a lot from them	7.96	2.05
8	The dragons' questions and feedbacks are beneficial to our learning	8.21	1.57
9	We were given enough time to familiarize ourselves with the case prior to the game	8.61	1.77
10	We have enough time to present our business proposals during our competition presentation	8.19	1.88
11	The game is a great learning activity, which enhanced my understanding of supply chain management knowledge	8.14	2.26
12	The game allows us to apply all our knowledge and skills	7.86	1.82
13	The game provided us an opportunity for everyone to participate	8.28	1.62
14	The game helped me to connect with other students	8.25	2.35
15	The multidisciplinary team has allowed me to learn from others and appreciate each other's expertise	8.19	1.73
16	Overall, how do you rate this game?	8.11	1.69

Note. avg, average; SD, standard deviation.

the game. In this section, we classify the feedback and discussions in three areas: supply chain management learning, stakeholder involved learning, and teamwork experiences.

5.1. Feedback on Supply Chain Management Learning

Supply chain management problems in the real business world are complex because they are not always well defined. Information is usually hidden or scattered, often requiring stakeholders to search from various sources. Data obtained must be compiled, screened, processed, and analyzed to draw useful information for decision-making. In many cases, there are no obvious right solutions. As illustrated by the game, the right solution for one stakeholder may not be the right solution for others. This often requires compromises to find win-win solutions, all the while considering different factors. The reality game brings these real-world aspects into the classrooms. For games played during the conferences, some data were provided to reduce the time for basic data searching, such as timber supply capacities at each forest zone, forest zone locations, mill locations, mill production capacities, production costs, and transportation costs. Other data, such as market demand and prices, were not provided due to their sensitive content. Without providing all the data, students needed to think beyond existing traditional business practices and learn how to search for required information. By interacting with real stakeholders, students better understood supply chain management issues in a real-life business environment.

Many students welcomed the challenges, as they expressed that challenges motivated their learning abilities and initiatives. For these students, searching for information and analyzing the problem were great experiences, leading to a deeper level of understanding. Other students preferred simpler cases with more data, such as target markets and their demand/price data. Interested organizers are recommended to adjust the level of information and the scope of the case as required.

Through the reality game, all students realized that each company was not an isolated entity; rather, a part of a larger business supply chain. Their decisions and practices could affect the business performances of other players in the supply chain. For example, poor quality chips could affect the quality of pulp and paper products. Late chip deliveries would force pulp and paper mill to keep larger safety stocks, which would increase its inventory cost. In addition, business decisions could be influenced by or have impacts on other stakeholders. For example, many students discovered how government policies could influence business decisions and how business expansions or building new factories could affect the local community for the first time. They found that discussions with the dragons on these aspects were inspiring, which stimulated their thinking and helped them to view the industry from different angles. Supply chain optimization is more than profit maximization or cost minimization. A good decision maker must think broadly, factoring in different social and environmental considerations in addition to the economic gains. Most students agreed that the reality game had enriched their learning significantly. It allowed them to apply theoretical knowledge to the real case and gain important practical knowledge from the stakeholders.

5.2. Experiences in Stakeholder-Involved Learning

Involving real stakeholders from industry, government, research institute, community, and university backgrounds made this reality game unique. The game is particularly important for senior-year undergraduate or graduate students because they get to know stakeholders and learn about their business realities. Students create connections with stakeholders, too, opening the doors to future internships, research, and career opportunities. Despite the limited time for students to interact with the dragons, most students really enjoyed their discussions with the dragons. Dragons' feedback during and after the game were particularly beneficial to students' learning. Most importantly, the game created an environment that brought together different partners, university students, and professors to bridge the gap between academic teaching and industrial practice. The dragons enjoyed meeting and supporting student learning, while the students had opportunities to share their recent knowledge and research with the dragons. Following the game presented in Example 2, during which students were required to develop business proposals for their new product commercialization, a company approached one of the teams. The company in question would like to continue working with the students on their product development project. Several dragons commented that it was good to see universities striking a better balance between academic teaching and business practice.

Last, coaches played an essential role during the short conference games, for they not only provided guidance to students but also served as mentors. Many of these coaches were university faculty members, industrial partners, and research scientists possessing extensive domain knowledge and expertise. From these coaches, students learned many practical skills in planning their tasks and managing their teamwork to complete the required deliverables. Further, many coaches enjoyed working with the students. One coach commented on the business analysis skills learned, stating that the experiences gained by solving real-case problems through this game would richly help the students in their future careers.

5.3. Teamwork Experiences

Teamwork was an essential element throughout the game. Many students stated that the game had helped them to connect with other team members, allowing them to engage and have fun together. Some students, shy to speak in public, found working in a small, friendly team environment easier. As one person shared an idea and others put forward other ideas, difficult game problems became easier. Additionally, many students said that the game activity encouraged them to share their research and development collaborations. They explained how multidisciplinary teamwork had allowed them to acquire other domain knowledge to broaden their knowledge and skills. Creating a teamwork environment is not without challenges, however, especially when games are played outside a classroom setting (e.g., during a conference where teams must be assembled with people from other universities and disciplines within a short period of time). This requires team members to adjust and work together quickly. Fortunately, organizers or coaches may prepare some activities to ease the stress. Another challenge lies in coordinating multidisciplinary team efforts to focus on common goals. Because different members have different domain expertise and different points of views, coordination may be more difficult. For example, industrial engineering students tend to consider the game as a supply chain optimization problem; chemical engineering students may perceive the game as a process design and technology development problem; business school students may perceive it as a new business development problem. In many ways, this coordination challenge reflects the real-life teamwork realities when new colleagues join the team. On the feedback form, several students stated, "teamwork requires compromises, positive attitudes, and good communication skills." Good coach support and a good captain greatly contributed to positive teamwork experiences. Teamwork challenges can be largely mitigated in classroom games where team members may have known each other or have more time to get to know each other.

6. Conclusions

It is challenging to train students in supply chain management to meet industrial needs. This type of management consists of imparting a broad range of knowledge from management science and methodologies to decision coordination and collaborations within and across supply chain entities with many stakeholders. Business decisions made by one stakeholder can have substantial economic, environmental, and social impacts on other stakeholders. Classical teaching methods of theoretical supply chain management knowledge and methodologies have shown limitations of connecting classroom teaching with real business practices. In this article, we presented a reality game based on the Canadian television reality show *Dragons' Den* and the parallel American show *Shark Tank*. The game methodology comprised a case method and an activity-based game whose objectives were to create a stimulating learning environment to engage students through role plays and interactions with industry, government,

research institute, and community stakeholders, that is, the dragons. In this article, we presented a game framework with guidelines for game preparation and execution. Primarily developed for course-long games in a classroom setting, the game could be adapted to other game environments. We provided two examples to illustrate how the reality game could be successfully played in short conference environments. We received positive feedback from the students, dragons, and professors. Students have learned significantly from this game by applying their problem-solving skills in a real-life case. Meanwhile, stakeholders engaged and supported students in their business projects, allowing them to discover new opportunities for project and research collaborations.

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