Global Sourcing Strategies: A Framework for Lean, Agile, and Leagile

Waleed Rashad 1 and Zlatko Nedelko 2,*

1 Faculty of Logistics, University of Maribor, Mariborska cesta 7, 3000 Celje, Slovenia; waleed.rashad@redachem.com
2 Faculty of Economics and Business, University of Maribor, Razlagova ulica 14, 2000 Maribor, Slovenia
* Correspondence: zlatko.nedelko@um.si

Received: 23 July 2020; Accepted: 27 August 2020; Published: 3 September 2020

Abstract: The main purpose of this paper is to develop a framework for utilization of lean, agile, and leagile strategies in the supply chains, where the core idea of the framework is to improve the global sourcing practices. Based on in-depth interviews with supply chain professionals and grounded theory approach, we constructed a framework of global sourcing improvement to support better utilization of lean, agile, and leagile strategies, which we believe can help the supply chains worldwide to act better, especially in various difficult conditions and sustain their business accordingly. Our proposed framework also contributes to the UN’s Sustainable Development Goals, since the core concept of the framework is to establish a new organization under the umbrella of the UN to improve the global sourcing and consequently the usage of supply chain strategies accordingly. The applicative part of the paper reveals characteristics of new developed framework, ranging from its purpose and aims, structure, key processes, functions, and its financing. Along with validation of the framework are presented benefits for society, industry, and global economy. Additionally, the paper also reviews the impact of the current health and economic crisis caused by COVID 19, on usage of the three supply chain strategies namely; lean, agility, and leagility to see how they can work in the difficult time, as COVID 19.

Keywords: lean; agility; leagility; supply chain strategies; grounded theory; collaboration; global sourcing

1. Introduction

The main purpose of this research is to develop a framework for utilization of lean, agile, and leagile strategies in supply chains, where the core idea of the proposed framework is to improve the global sourcing practices. With the proposed framework, we try to achieve the best utilization of the lean, agile, and leagile strategies under various circumstances, especially economic crisis, and consequently improving the utilization of these three considered strategies and results of supply chain management.

The continuous changes in the global markets pushed many supply chains to change their strategies, as it became very crucial to have the maximum possible flexibility to keep up with the new changes in the markets [1,2]. This study tries to analyze the current situation of the supply chain, and develop an adequate framework for future management of supply chains—i.e., by outlining how to utilize lean, agile, and leagile strategies under different circumstances. Although, there are many publications, which reveal the current knowledge of the supply chain, and the various strategies in today’s business environment [3–9], the current literature does not provide a sufficient insight, how lean, agile, and leagile strategies can be used under different business circumstances to successfully support supply chain management in the future. Furthermore, there is clear paucity of the research aiming to discover the future of the supply chain concept and its strategies, if dramatic changes happen in the global business environment, like economic crisis, shortage of materials, and recently the current...
health and economic crisis [10]. This research also coincides with the current situation, where we faced with economic crisis due to COVID-19, which will be additionally discussed in the paper.

In the response to the above concerns, this research first investigates if the current supply chain strategies are adequate for the future business environment, and outlines the need for developing a new framework to support the utilization of these strategies under different future circumstances. It contributes to the efforts aiming to develop a new theory of a global chain suitable for the future and sustainable supply chain strategies. Currently, organizations are starting to feel how it is important to review the supply chain strategy and change it to keep up with the continuous changes in the markets. In 2011, the American Production and Inventory Control Society “APICS” research department conducted a survey of more than 9000 operations management professionals on the topic of supply chain strategy. Results revealed that 33% of the participants confirmed that their supply chain strategy was adopted within the last 2 years, while 30% confirmed it was adopted within the last 3–5 years [11]. So, adapting the supply chain strategy is not a choice now in fact, but it is essential to run any business. In line with outlined cognitions, we conducted interviews with supply chain professionals around the globe and developed a new framework for utilization of lean, agile, and leagile supply chain strategies in the future, where the core idea of the framework is to improve the global sourcing practices, using the grounded theory approach. As there is a fear, that due to the severe economic conditions, the concern for natural and social concern may decrease, the new proposed framework will also follow the aims of sustainable supply chain strategies development [12–15], by developing a framework in a way to contribute and support sustainable supply chain management practices in the future. This will correspond to the UN Sustainable Development Goals and support their faster implementation around the globe. A next distinctive phase of our research was to validate the proposed framework, where we conducted the interviews among supply chain professionals to acquire their opinions about the developed framework.

The limited supply chain collaboration will not enable the business to survive in the difficult situations, but there must be some kind of global collaboration on a large scale. Thus, the collaboration can help to overcome circumstances of extreme high level of uncertainty [16]. Since many authors believe that building collaborated and trustable business relationships is the clue to overcome the uncertainties [17–19], the new developed framework is based on global sourcing practices. This is the core concept of the proposed framework of this research. The proposed framework is concerned with improving the global collaboration of the international business, and this is a clue for supporting the supply chain strategies to work better in the future, especially under different circumstances.

The structure of the paper is as follows. First, we provide a relevant literature review about the supply chain and three selected supply chain strategies, namely lean, agile, and leagile strategy. Next, we outline the usage of grounded theory and the resulting new developed framework, with its detailed descriptions. Afterwards, results from the validation of the proposed framework are outlined. The paper is concluded with the limitations and future outlook. The framework development and its validation practical implications for supply chains have been analyzed based on the newly developed framework. The paper also addresses the usage of a new framework in the relation with the current situation caused by COVID-19.

2. Literature Review

Striving from the typical trade off that companies are facing in supply chains—to be cost effective vs. responsiveness [20]—companies are often under pressure to be cost effective and respond to the customers’ requirements at the same time [21], which is becoming essential for any sustainable supply chain. This pressure is increased in the uncertain business environment, since it is difficult to predict the changes of the markets, and furthermore, to adjust the operation of the supply chain with these changes over time [20], especially nowadays in a highly competitive environment [22–25].

It is a challenge for any supply chain nowadays to match supply and demand responsively and effectively at the same time. Hence, it is necessary for modern supply chains to balance their strategies
and position them in a framework of responsiveness and effectiveness [26]. The responsiveness enables supply chains to achieve a quick response to changes in the markets and satisfying the customers, while the effectiveness is very important to control the cost of the supply chain perfectly. Accordingly, the balance between both—i.e., responsiveness and effectiveness [27], is the ultimate aim of the supply chain, however, prioritizing one against the other can lead to an unbalanced strategy [20].

As suggested by several authors—like [26,28,29], the achievement of effective and responsive approach is possible, if the supply chain is supported with adequate lean, agile, and leagility strategies [3]. Based on cognitions from the literature and business practice, we emphasize three key strategies; lean, agility, and leagility, which can help the supply chain to achieve the balance of responsiveness and effectiveness [26,28,30].

The lean strategy is developed to deal with the effectiveness of the supply chain, while the agile strategy is concerned with time [27] and thus it deals with the responsiveness [3,27]. The leagile strategy aims to achieve the balance between both mentioned strategies in order to enhance the competitiveness of the supply chain [4,29,31,32]. Therefore, it is very important for supply chain professionals to understand the core concept of lean and agile strategies and how they can be merged together to generate a leagile strategy [3,33].

In a study conducted by [34] with 308 manufacturers, it was found that 90% of the participated organizations reported that they are committed to lean, but the further analysis showed that less than 10% of these organizations can be considered as best in class.

While lean strategy is not commonly used among many organizations compared to other management tools and strategies, only few organizations were able to achieve the best utilization of lean. While the others achieved some benefits only as a result of the practice they followed while implementing lean principles, especially related to the limited deployment of lean in the organization as stated by [34] (p. 1), “While over 90% of respondents consider themselves lean, less than 20% have extended their lean deployments beyond the manufacturing shop floor”. So, it is important in this research to explain the lean strategy very well and explain how to get the best benefit when lean is deployed.

The agility is inversely proportional to lean, whenever we reduce the cost and being effective, this affects the time required of performing the activities, and whenever we eliminate the lead time, it increases the cost of performing the activities. This tradeoff is always there [35]. The main challenge of the supply chain is to control both, i.e., the lead time and cost in order to satisfy the end customer [36]. In order to control the cost and lead time together, the supply chain can improve the planning in accordance with requirements of materials within the supply chain [37]. If the safety stock is maintained well, and there are periodic forecasting reports, this can help the supply chain to overcome any shortage of materials, which may lead to urgent airfreights and unnecessary expenses.

However, beside understanding the various strategies of supply chain, we should also understand the future trends of the global markets and how they determine if these strategies can “survive and work” under severe conditions currently and in the future. This is very important for the supply chain sustainability, especially at the time of crisis or any significant changes of economic circumstances, the current strategies may not be suitable to support the business in a most optimal manner, and consequently, we need an innovative approach for development and operation of new generations of supply chains [38,39].

Thus, current literature does not provide any insight how three outlined strategies—lean, agile and leagile—can be used under severe conditions to successfully support supply chain management.

The current health and economic crisis resulting from the coronavirus is huge and it is important to see if it will affect the supply chain strategies, and what could be done to support the supply chain strategies to face the emerging challenges in the global markets.

The unstable political and economic situation globally has increased the concerns about the supply chain practice in such a difficult situation as this is increasing the level of uncertainty and making the supply chain vulnerable to real risks [40,41]. For example, there is a huge health and economic crisis in
2020 resulting from the coronavirus worldwide, the oil price is completely unstable during the last decade. Moreover, there are many wars occurring around the world and the potential for new ones is higher. Consequently, there are difficulties in running a business in such circumstances while assuring smooth material supply [42].

The organizations always seek to implement the best strategies for their supply chains, and any new practices that could lead to optimization of business is much appreciated [43]. This now became an essential factor to run and sustain any business, to be competitive in the market, and survive in the future [44]. The information technology solutions help the supply chain to achieve this goal of building new strategies based on collaboration with business partners [45]. The lean, agile, and leagile strategies are useful for any supply chain, but the key point here is to know how to select the suitable strategy according to the various situations [46]. This represents a challenge in the normal situations, but it will be much a more complex challenge in difficult times and in abnormal situations, where these strategies may not be enough to enable the supply chain to survive in the future, and we may need a new approach with innovative ideas [47].

Innovation should not stop over time towards sustainable supply chain strategies, and the supply chain researchers and professionals should work collaboratively always to develop new ideas and techniques, which add value to the supply chain and contribute to it in the future. [48] (p. 335) described the innovation as “IT-based and time-limited competitions arranged by an organization or individual calling on the general public or a specific target group to make use of their expertise, skills or creativity in order to submit a solution for a particular task previously defined by the organizer who strives for an innovative solution”. Based on this definition the supply chain strategies should seek for innovative ideas for improvement and these ideas should utilize the new technologies. The innovation is essentially required for the supply chain strategies to keep up with the continuous changes in the markets. As [47] (p. 125) reported, “Innovation is an essential driver of growth, differentiation, and profitability in a supply chain”. So, innovation to the current supply chain strategies is the key success factor in the current business environment, while it is even more important for survival in the future. We meant, by innovation development of current known supply chain strategies and/or adding new strategies to the supply chain and/or innovative usage of this strategies.

All the success stories of the large organizations are based on the innovative supply chain strategies as indicated by [49] (p. 124), who outlined that “there is no coincidence between the success of retailers such as Amazon and Walmart and their innovative supply chain strategies”.

To sum up, the supply chain collaboration is the clue to enhance lean, agility, and leagility to work better in the future and to help the supply chain to overcome any sudden changes in the global markets [50].

In line with aims of this paper and outlined cognitions, we developed three propositions in this research.

1. The current knowledge and utilization of lean, agility, and leagility cannot provide complete support to the supply chains in the circumstances of severe conditions.
2. To achieve the supply chain sustainability in severe conditions, there is a need for a new framework to support the utilization of lean, agility, and leagility.
3. Our developed framework can support lean, agility, and leagility to work better in severe conditions, like economic crisis, shortage of raw materials, or health crisis resulting from Covid 19, for example.

3. Research Methodology

Our research has two distinctive steps. In the first step we depended on the grounded theory as the main research method, where we conducted semi structured interviews to acquire the opinion of supply chain professionals about their understanding about lean, agility, and leagility, how they work in the normal situations and how they are fit for difficult situations. The outcome of this stage provides a cornerstone for constructing the new framework. Based on the deep analysis of both the
literature review and the answers gathered from the interviews, coding these data through open codes and axial codes, we will be able to reach the selective code which represents the focal point of building the proposed framework.

In the second step of the research, we validate the newly established framework and try to ensure it can fill the gap, which was highlighted initially in the first phase of the interviews. We present the constructed framework and our cognitions to the participants in the field survey and gather opinions from them.

3.1. Grounded Theory

This research method is effective when we want to see the interaction of the people to the events in their lives and figure out solutions for that [51]. The grounded theory is a suitable methodology for creating theory from the data gathered and analyzed systematically [52]. The grounded theory has an innovative approach, as it aims to generate new ideas. Using a grounded theory “implicitly assumes that the analyst will be creative” [53] (p. 20). The grounded theory does not aim only to observe a phenomenon, but to leverage the thinking of the researcher from just observation to analytically build a new theoretical framework [54].

3.2. Sampling

Following the guidelines of grounded theory [55,56], we conducted semi-structured interviews with 150 supply chain professionals. Focus on supply chain professionals reflects on the research practice in this area and is dictated with the notion that participants, who can provide meaningful, relevant data about the phenomenon investigated were selected [57]. Participants were identified based on their experience with the phenomenon, job titles, job profiles, articulation skills, and willingness to participate, as well as business relations with the authors of this research. This implies that we have a convenient sample.

Supply chain professionals hold positions in a wide variety of industries including oil and gas, energy, petrochemicals, chemicals, food, pharmaceutical, equipment, logistics, shipping, freight forwarding and transporters, manufacturer, and service providers. The sampled firms represent a variety of major players with extensive global supply chains, have worldwide revenues ranging from $50 million to over $50 billion, and exist at different levels of supply chain, e.g., assembler, manufacturer, supplier, distributor, and a third-party logistics service provider.

The interview participants have various job titles, including senior managers, supervisors, and mid managers.

Most of the interviewees had senior-level managerial experience with other firms (and industries) before taking on their current jobs. Some are long time employees of their current companies and are able to provide a historical perspective of their firm and their decision-making responsibilities. Discovering common themes and concepts among a wide variety of respondents in a given context helped get to the core of the phenomenon.

We used the same sample of supply chain professionals in both research stages, where we first gathered opinions for framework development, as well as in later stage, when we validated the model.

Following the guidelines of grounded theory [55,56], we conducted semi-structured interviews with 150 supply chain professionals. We selected them as they can provide meaningful, relevant data about the phenomenon investigated [57] in this survey. Participants were identified based on their experience with the phenomenon, job titles, job profiles, articulation skills, and willingness to participate, as well as business relations with the authors of this research. This implies that we have a convenient sample.

Supply chain professionals hold positions, including senior managers, supervisors, and mid managers, in a wide variety of industries including oil and gas, energy, petrochemicals, chemicals, food, pharmaceutical, equipment, logistics, shipping, freight forwarding and transporters, manufacturer, and service providers. The sampled firms represent a variety of major players with extensive global
supply chains, have worldwide revenues ranging from $50 million to over $50 billion, and exist at different levels of supply chain, e.g., assembler, manufacturer, supplier, distributor, and a third-party logistics service provider.

We used the same sample of supply chain professionals in both research stages, where we first gathered opinions for framework development, as well as in later stage, when we validated the model.

3.3. Interview Process

According to the research practice and suggestions by [58,59], the researchers using grounded theory approach should start out by asking broad, open-ended, and grand-tour questions guided by the extant literature review. As we started by asking broad questions related to the concept of supply chain strategies—namely lean, agility, and leagility, these broad questions were formulated from the careful reviewing of literature related to the researched subject. Then, specific questions were addressed in the interviews related to the utilization of these strategies in practice of supply chain management.

The qualitative research guidelines suggest that interviewing enough participants must be done until saturation is attained, which is usually eight or fewer informants [59–61] or up to 20 participants [62,63]. In our research, we considered this as merely guidelines in our interviewing process. Since we have included professionals from various continents, various organizations, and various levels of management, etc., we considered to expand the number of respondents in order to ensure comprehensive insight into the actual practice of supply chain management in various cultures, organizations, at organizations levels, due to the possible differences, culture, type of organization, manager’s positions, etc. [58,59,62].

The theoretical saturation (i.e., no new information or insights obtained from additional interviews) was attained in the first phase of the research after 150 interviews, some interviews were done in face-to-face meetings and others over phone calls. The interviews were conducted until a clear understanding of the perspective of the supply chain professionals was reached, specifically related to the core concept of lean, agility, and leagility from the practical point of view and the utilization of these strategies in the supply chain now and in the future presented scenarios.

The subject of the research and questions presented in the interviews allowed using phone and face-to-face meetings. The duration of each interview was about 20–30 min. After the collection of answers in each interview, we presented a summary of the key points to the participants so he/she can review, add, amend, or remove any information. This is to ensure that the participants all understood the subjects of the phenomenon and all the answers represent his/her opinion perfectly.

The answers were gathered and calculated to see the final results, showing the percentage of the participants selecting specific answer in multiple questions format. These interviews were done in 2019.

3.4. Interview Protocol

The interviews always should start with an introduction between the interviewer and the participants. The next step was the overview of the research subject and to present brief information about the aim of the interview and the topic of the discussion.

We assured the participants that all their identities would be confidential and the results would be presented objectively, where the names of the participants, the name of their organizations, and identities would remain confidential. Full details of the jobs of the participants, industries, size, and geographical locations are presented in the demographic characteristics section later on.

The questions were formulated in a simple structure to be understood easily by the participants. Examples of the questions are as follows. How do you rate your knowledge of supply chain strategies? Please explain about what you know for lean, agility, and leagility. Another question is: Do you implement any supply chain strategy in your organization? Please explain about what you know relating to supply chain strategies implementation.
The author depended on his knowledge of supply chain strategies to create understandable questions. To ensure the systematic collection of answers, only one question was asked to the participants at a time, once they confirmed their understanding of the same and chose the answer, we moved to the next question.

We have closed questions with several possible answers, thus the structured interviews were based on selecting the best answer from the given choices presented to the participants.

Consistent with qualitative research guidelines [59], the researchers used grounded theory to collect, code, and analyze the interview data continuously throughout the interview process. The interview transcriptions are sometimes analyzed using software like Atlas.ti, for example [64,65], which enabled an objective evaluation of the transcripts. In this research, we do not depend on specific software, but the analysis is done manually through focusing on relationships and connections, while collecting the data and searching for similarities, differences, categories, then reading all the data and diving into smaller more meaningful units in order to create the categories and codes. As stated by [64] (p. 69), “Using a program such as Atlas.ti to conduct the analysis does not necessarily have to be in line with grounded theory methodology, but the theory does explicate detailed procedures for coding and memo writing.”

Table 1 Outline of demographic characteristics of participants in the interviews.

| Functional Areas | Participants Industries | Geographical Areas | Company Size | Participants Positions |
|------------------|------------------------|--------------------|--------------|------------------------|
| Supply chain (70) | Manufacturing (40)     | Middle east (50)   | Over 1000 employees (70) | Senior managers (35) |
| Sales (35)       | Trading (20)           | Europe (35)        | 600 to 1000 (40)       | Supervisors (45)     |
| Accounts (15)    | Logistics (40)         | China (20)         | 200 to 600 (20)        | Mid managers (70)    |
| Administration (10) | Constructions (20) | USA (20)            | Below 200 (20)         |                        |
| IT (20)          | Oil and gas (30)       | Others (25)        |                           |                        |

\(\text{\textsuperscript{a}}\) number of respondents are in brackets.

4. Development of the Framework

In the section below, we outline interview questions, open, axial, and selective coding in the frame of grounded theory approach, which resulted in a new developed framework. In Table 2, we outline the questions for the 1st phase of the research—i.e., interview.

4.1. Open Codes

Table 3 presents categories and open codes, using grounded theory approach. We present four categories as outlined below, and each code is referred to specific idea in the research and/or the questions in Table 2. Each category has its own codes, which could vary from category to category. Additionally, some codes are defined in one or two categories, as each of the four defined categories have unique characteristics, reflecting that each category has different codes.
Table 2. Interviews in the 1st phase.

| Question                                                                 | Choice 1                                | Choice 2                                | Choice 3                                | Choice 4                                |
|--------------------------------------------------------------------------|-----------------------------------------|-----------------------------------------|-----------------------------------------|-----------------------------------------|
| 1-Knowledge of strategies; lean, agility, and leagility                  | Good knowledge (62%)                    | Expert (17%)                            | Some information (16%)                  | Do not know (5%)                        |
| 2-implementation strategy                                                | Lean (44%)                              | Agility (18%)                           | Leagility (15%)                         | All of them (23%)                       |
| 3-Number of years using strategy                                        | 4–10 Y (38%)                            | 10–15 Y (29%)                           | More than 15 Y (15%)                    | 1–3 Y (18%)                            |
| 4-Highest priority of SC                                                | Reducing cost (30%)                     | Cash flow (25%)                         | Responsiveness (24%)                    | Quality (21%)                          |
| 5-strategies benefits                                                   | Enhancing competitiveness (36%)         | Minimizing inventory (23%)              | Reducing order cycle time (22%)         | Increasing flexibility (19%)            |
| 6-Lean and agility relations                                            | Complementary (64%)                     | Alternatives (29%)                      | Opposite (7%)                           | -                                       |
| 7-Utilization of single strategy                                        | Lean (45%)                              | Agility (30%)                           | Leagility (14%)                         | transformation process (11%)            |
| 8-Enablers of single strategy                                           | IT (39%)                                | HR (25%)                                | Corporate management (21%)              | integration (15%)                      |
| 9-Recommended strategy in uncertainty                                   | Leagility (73%)                         | Lean (14%)                              | Agility (13%)                           | -                                       |
| 10-Achieving leagility                                                  | Collaboration (53%)                     | Demand forecasting (25%)                | Postponement (22%)                      | -                                       |
| 11-Strategy change per product                                          | Yes (54%)                               | Depending on products characteristic (31%) | No (15%)                              | -                                       |
| 12-future challenges                                                    | Economic crisis (47%)                   | War threats (26%)                       | Energy problems (15%)                   | Currencies fluctuation (12%)           |
| 13-Tools to overcome future challenges                                  | Innovation (38%)                        | collaboration (29%)                     | HR improvement (19%)                    | government aids (14%)                  |
| 14-The role of IT                                                       | Must supported by Gov (35%)             | Must be supported by HR (29%)           | IT facilitates collaboration (25%)       | It can work alone to overcome the challenges (11%) |
| 15-Difficulties of material sourcing                                    | Finding the right suppliers (45%)       | Gov rules (27%)                         | Collaborating with suppliers (23%)       | Others (5%)                            |
| 16-Key functions of future                                             | Harmonization of all functions (34%)    | Manufacturing and innovative technologies (25%) | Sales (21%)                            | Global sourcing (20%)                  |
| 17-Satisfaction of global sourcing                                      | Unsatisfied (45%)                       | Satisfied but needs improvement (26%)   | Totally unsatisfied (20%)               | Very satisfied (9%)                     |
| 18-Improving global sourcing                                            | Innovative IT (32%)                     | Finding new suppliers (31%)             | Standard rules to have reliable suppliers (19%) | Business process standardization (18%) |
| 19-Impact of improving sourcing on strategies                           | Ultimate support (50%)                  | Change of entire business environment (21%) | Improve some strategies (16%)           | Vary from organization to another (13%) |
| 20-Ability of strategies to cope with future challenges                 | Need supportive tools and improvement (75%) | Need major change of strategies (23%)   | Yes, they can work now (2%)             | -                                       |
Table 3. Categories and open codes.

| Code NO | Category # 1 Lean | Category # 2 Agility | Category # 3 Leagility | Category # 4 Future Trends of the Markets |
|---------|-------------------|----------------------|------------------------|-------------------------------------------|
| 1       | Removing waste of SC (Q 1 and 2) [3–5] | Expediting the activities across the SC [32,63,66] | Combination of lean and agility to utilize the benefits of both (Q 1 and 2) [3,4,7] | The global markets are in continuous changes and this trend is expected to grow substantially in the future [1,13–15] |
| 2       | Following the most economical SC practice always [5,29] | Prioritizing the reduction of lead time even with higher cost [3,4,36] | Trading off between lean and agility according to the situation [3,4,66] | The economic and political situation globally could lead to difficult scenarios for the conduction of international business [1,13–15] |
| 3       | Best utilization of the available resources of the [3–5,34] | Achieving high level of customers satisfaction through agile deliveries [3,4,33] | Maintaining a generic stock for customization as per the request of the customers (Q 1 and 2) [3,4,33,34] | The SC which cannot keep up with the sudden and major changes of the global markets, will not be able to survive in the future [40–42,62,67] |
| 4       | Achieving the maximum possible profitability [3–5] | Requires high level of information technology usage for exchanging real time data (Q8) [50,68] | Requires high level of information technology usage for exchanging a real time data (Q8) [50,68] | There is essential need to reduce the impact of the future challenges of the global markets on SC (Q 13) |
| 5       | Avoiding unnecessary movement of materials across the SC [3–5] | Increases the overall cost of SC [3,4,6,26] | Utilizing the stock in different purposes by storing it as raw as possible (Q 1 and 2) [3,4,6] | There are difficulties facing the organizations for implementing SC strategies for collaboration and outsourcing (Q 15) |
| 6       | Simplifying the business (Q 1 and 2) | Requires high level of collaboration with all business partners (Q 1 and 2) [31,33,38] | Requires high level of collaboration with all business partners (Q 1 and 2) [31,33,38] | Lean, agility, and leagility are key strategies SC in current circumstances, but they need supportive tools to work better in the future (Q 19 and 20) |
| 7       | Just in time production (Q 1 and 2) [3,4,6] | Reducing the lead time to the end customers and considering this as top competitive advantage [3,4,6,26,38] | Depending on the pull strategy to trigger the customization process (Q 1 and 2) [3,4,6,26,38] | The information technology is very important tool to support the SC to overcome the future changes and challenges of the global markets [50,68] (Q 14) |
| 8       | Pull strategy (Q 1 and 2) [3,4,6,26,38] | Keep up with the dynamic business environment | Using the postponement technique (Q 1 and 2) [3,4,26] | |
| 9       | Kanban technique (Q 1 and 2) [3,4,6] | Market oriented philosophy (Q 1 and 2) [38,66] | Innovative approach of integration of lean and agile principles (Q 1 and 2) [7,33,69] | |
| 10      | Continuous improvement (Q 1 and 2) [3,4,6,26,38] | Requires well trained and professional workers to operate the system perfectly (Q 1 and 2) | Requires well trained and professional workers to operate the system perfectly (Q 1 and 2) | |
| 11      | Reducing the lot sizes and eliminating the over production (Q 1 and 2) | Can be useful for the SCM in difficult times (line 164) (Q 9) | Can be useful for the SCM in difficult times (Q 9) | |
| 12      | Production leveling (Q 1 and 2) | It maybe not enough to work alone in the severe conditions (lines 167–168) (Q 9) | It maybe not enough to work alone in the severe conditions (Q 9) | |
| Code NO | Category # 1 Lean | Category # 2 Agility | Category # 3 Leagility | Category # 4 Future Trends of the Markets |
|---------|-------------------|----------------------|------------------------|------------------------------------------|
| 13      | Require high level of information technology utilization for exchanging a real time data (Q 8) [68] | It requires high level of speed and flexibility within the SC (Q 1 and 2) [38,66] | It requires high level of speed and flexibility within the SC (Q 1 and 2) [38,66] | |
| 14      | Offering competitive prices to the customers [3,4,6,26,38] | Ideal for the SCs dealing with products having short life cycle (Q 1 and 2) [3,4] | |
| 15      | Maintaining high level of quality (Q 1 and 2) [3,4] | | |
| 16      | Respecting people and their safety (Q 1 and 2) [3,4] | | |
| 17      | Focusing only on the activities which create value to the customers [3–5] | | |
| 18      | Requires well trained and professional workers (Q 1 and 2) [5] | | |
| 19      | Associated with longer lead times than the agile strategy [3,4,6,29] | | |
| 20      | Lower flexibility while having a decision due to the cost restrictions [3,4,6] | | |
| 21      | Requires high level of collaboration with all the business partners (Q 1 and 2) [3–6] | | |
| 22      | useful for the SCM in difficult times [3,4,6] (Q 9) | | |
| 23      | It maybe not enough to work alone in severe conditions (Q9) | | |

*Q xx refers to the question number in Table 2, while [xx] are showing references for creation of open code.
4.2. Axial Codes

According to [70] (p. 272), “for theory formation what is of particular importance, is the development of relationships between the axial categories and the concepts that are related to them in terms of their formal and content aspects”. As we use the grounded theory as the main research method in this research, this step of axial coding is very essential to form the core characteristics of the new proposed framework for utilization of lean, agility, and leagility strategies in supply chains under different scenarios.

In this section, we present the axial codes. In line with research practice, it is here important to highlight the propositions on the axial codes in order to present them on the conditions and contexts of the phenomenon subject of the research, then to present the actions and consequences accordingly. In Table 4, we linked 4 categories to 23 open codes. It is seen that some categories are linked to multiple codes and some linked to one code only. In this process, we try to narrow the various ideas discussed in the research to reach finally one (selective code) in order to build our framework based on it.

Before presenting the axial codes, it is useful to present first how these axial codes are extracted from the open codes, which were outlined above. The main idea of this process is to focus on the specific phenomenon subject of research. We presented all the categories and codes of the research (see Table 3). Next, we narrow these ideas to specific phenomenon by linking the categories to the relevant codes. The objective here is to leverage the knowledge presented in so far research to the higher thinking point, as per the approach of the grounded theory by establishing axial codes to reach selective code at the end. Accordingly, in Table 4, we outline each phenomenon presented among the axial codes and its relevant link with the open codes by category and code numbers, where categories refer to the above categories of open codes (i.e., 1—lean, 2—agile, 3—leagile, 4—future trends) and single code numbered by sequence within the categories.

| Phenomenon                                                                 | Category | Open Code |
|---------------------------------------------------------------------------|----------|-----------|
| Managing future supply chains trends—utilization of lean, agile, and leagile strategies | 4        | 4-5-6     |
| Lean, agile, and leagile strategies can be useful for the supply chain management in different circumstances | 1        | 22        |
|                                                                           | 2        | 11        |
|                                                                           | 3        | 11        |
|                                                                           | 4        | 6         |
| Lean, agile, and leagile strategies cannot work alone in the presented scenarios developed by the author | 1        | 23        |
|                                                                           | 2        | 12        |
|                                                                           | 3        | 12        |
|                                                                           | 4        | 6         |
| Lean, agile, and leagile strategies require high level of information technology support | 1        | 13        |
|                                                                           | 2        | 4         |
|                                                                           | 3        | 4         |
|                                                                           | 4        | 7         |
| Lean, agile, and leagile strategies require well trained and professional workers to operate the supply chain perfectly | 1        | 18        |
|                                                                           | 2        | 10        |
|                                                                           | 3        | 10        |
| Lean, agile, and leagile strategies require high level of collaboration with all the business partners in frame of supply chain | 1        | 21        |
|                                                                           | 2        | 6         |
|                                                                           | 3        | 6         |
|                                                                           | 4        | 5         |

In the next step, in the frame of axial coding process according to Strauss and Corbin (1990), we identify phenomenon subject of researching and its casual conditions, context, action strategies, and consequences. In our research, we followed this procedure and thus, we present each phenomenon in a separate table with all the relevant elements. In Tables 5 and 6, we present 6 axial codes.
Table 5. Axial codes 1, 2, and 3.

| Element       | Axial Code 1                                                                 | Axial Code 2                                                                 | Axial Code 3                                                                 |
|---------------|-----------------------------------------------------------------------------|------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| Phenomenon    | Managing future SC trends and utilization of lean, agile, and leagile strategies | Lean, agile, and leagile strategies can be useful for SCM in difficult times | Lean, agile, and leagile strategies cannot work alone in severe conditions    |
| Casual conditions | Current knowledge and utilization of lean, agility, and leagility cannot provide complete support to SC in the severe conditions (proposition 1) | Lean, agile, and leagile strategies help the SC to be effective and responsive | The dramatic changes of the global markets require more effective and innovative tools for managing SC |
| Context       | The continuous changes of the global business environment currently and in the future, made it essential for the decision makers to search for new supportive tools to enable the SC strategies to cope with future trends of the global markets | Lean, agile, and leagile strategies are strategies aiming to satisfy the customers | The severe conditions need a new framework for managing future SC             |
| Action strategies | To sustain the SC in the severe conditions, there is a need for new framework to support the utilization of lean, agility, and leagility (proposition 2) | It is recommended to implement lean, agile, and leagile strategies in SC | Developing a new framework for managing future SC under different circumstances, via utilization of three considered strategies |
| Consequences  | Our developed framework can support lean, agility, and leagility to work better in the severe conditions (proposition 3) | Improving the SCM practice | To handle the SC and managing SC in severe conditions                         |

Table 6. Axial codes 4, 5, and 6.

| Element       | Axial Code 4                                                                 | Axial Code 5                                                                 | Axial Code 6                                                                 |
|---------------|-----------------------------------------------------------------------------|------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| Phenomenon    | Lean, agile, and leagile strategies require high level of IT support | Lean, agile, and leagile strategies require well trained and professional workers to operate SC | Lean, agile, and leagile strategies require high level of collaboration with all business partners in SC |
| Casual conditions | The IT is required for exchanging real time data in the SC | SC strategies cannot be implemented without well trained and professional people | Lean, agile, and leagile strategies cannot be implemented without collaboration with all business partners in SC |
| Context       | The IT is an essential tool for implementing lean, agile, and leagile strategies | Implementing proper SC strategy is a crucial factor for business success and success of SC | The collaboration enables the SC partners to achieve value chain across the SC |
| Action strategies | Implementing advanced IT in SCM and operations | The human resources must be trained before implementing considered strategies in frame of SCM | Establishing effective collaboration with all business partners in SC |
| Consequences  | Improving SCM | Proper implementation of the principles of SC strategies in frame of SCM | Improving the SC performance |
4.3. Selective Coding

Throughout the history of the supply chain, all the developed techniques are revolving about collaboration with other business partners in the supply chain, starting from a single company doing everything in house to the stage of engagement of multiply business partners in one supply chain, and finally to the connect off various supply chains together. All these ideas were running around a single concept named “collaboration”. Consequently, it is useful to start from this point. “In the future, companies will need to use collaboration to keep their innovation flow filled” [67].

This concept of “collaboration” is nominated as a single research point and selective code.

The reason for selecting the collaboration as selective code for this research is that, the major changes of the global markets must be handled through collaboration between all the supply chains partners globally to overcome the negative impact of such changes or at least to reduce its consequences as much as possible [67,71–73]. In addition, implementing any strategy of the supply chain, without focusing mainly on enhancing the collaboration, is useless.

The severe conditions currently in the business environment represent an extremely high level of uncertainty, and only collaboration can help to overcome pre-supposed circumstances [16]. The limited supply chain collaboration will not enable the business to survive in difficult situations, but there must be some kind of global collaboration on a large scale. This is the core concept of the proposed framework of this research. The proposed framework will add additional value regarding the utilization of the supply chain strategies, namely lean, agile, and leagility under severe conditions. It will have implication to change the nature of these strategies and the way for implementing them in any supply chain.

4.4. Framework of Global Sourcing Improvement

There are many comments received from the supply chain professionals on how to support the supply chains strategies utilization in the future to cope with the various challenges. After organizing the responses from interviews, it was obvious that the supply chain professionals are looking mainly to improve the global sourcing process, as they believe if the sourcing practice is improved, this will play a crucial role to support the supply chain strategies utilization to face the future challenges. In turn, based on this point, the proposed framework is created in this research. The framework is developed to fill the recognized gap by organizing all the resources globally in a systematic manner and under a legal umbrella.

The above outlined cognitions allow us now to develop a framework for managing future supply chains utilizing lean, agile, and leagile strategies. As explained in the previous sections, we now reached the core idea of the proposed framework, which we need to create, based on the analysis done for coding the interviews. We need a framework to improve the global collaboration process, which will play an essential role to improve the supply chain strategies utilization and sustainability of these strategies in the future, as indicated clearly by the supply chain professionals interviewed before. So, hereunder, we present the core idea of the proposed framework.

The proposed framework is concerned with improving global collaboration of international business, and this is a clue for supporting the supply chain strategies to work better in the future, especially under three identified scenarios.

Our proposed framework is composed of core elements of changing the traditional practice of supply chain collaboration by establishing a new global resources management organization. With that framework, we try to interface the supply chain strategies to the circumstances of the markets and leverage the collaboration to the international level and single channel manage this collaboration globally.

The framework, which we propose is “International resources management organization”— IRMO, aims to improve the global collaboration between the supply chains as clearly identified by the professionals in the interview as the core subject for improving the supply chain strategies utilization and sustainability of these strategies in the future. Consequently, global collaboration is identified as
4.5. The Need for New Global Organization

Currently known supply chain collaboration tools are usually utilized in various forms, like:

- Organized relationships between an organization and some of its partners [74].
- Relationships between supply chain and another supply chain—not individual organizations.
- Some business associations for each industry, where the companies can participate to get better collaboration tools. For example, Elemica which is one of such associations for the chemical industry, enabling the participated companies to integrate their different enterprise resource planning “ERP” systems [68].
- The chambers of commerce in each country represent some kind of collaboration, where the companies can meet and collaborate together.
- We can consider also the trade unions, as a type of collaboration in business.

We propose a new type of collaboration, which we think is most effective. This proposal aims to establish a single organization under a name of IRMO. We suggest to run this organization by the UN, as UN is a specialized agency.

As [75] believe, in the high uncertainty of the business environment, it is crucial for the supply chain to keep a wide range of suppliers’ base to ensure the availability of the materials always. The proposed organization can play this role perfectly by allowing the supply chains to rapidly select its business partners with the utmost level of reliability. Consequently, it can act on time, always to respond to the changes in the marketplace [66].

If any supply chain is seeking to improve the response to the unexpected events in the markets and changes of the requirements of the customers, it must look to develop the collaborative relationships with the suppliers [76]. As explained above, the collaboration is considered as the selective code of the research. The important challenge for the collaboration is associated with the selection of the appropriate business partners [71,77]. IRMO is proposed to facilitate this task to the supply chains.

Many authors believe that building collaborated and trustable business relationships is the clue to overcome the uncertainties [17–19]. That is why the IRMO is needed to play this role and help the supply chains to utilize the strategies to overcome the future challenges resulting from the extreme level of uncertainty.

We presuppose, that the utilization of SC strategies in the difficult conditions needs a supportive framework, which can be seen from the outlined literature in this manuscript, and especially from the answers of survey participants, which suggested in the interviews (i.e., in the first phase) that a framework for global sourcing is needed to help the SC strategies to work better in difficult conditions. This is the basis of our framework, and reflects the actual needs of the supply chain professionals. Based on the presented ideas and the codification process, we developed the framework, which was tested later on, asking supply chain professionals about it (Section 5).

4.6. The Purpose and Aims of IRMO

The main purpose of establishing IRMO is to work as a data bank of all the global businesses, enabling the companies to reach each other quickly through a reliable channel, and this will play a very important role to support lean, agile, and leagile strategies utilization to work better in the future within the special type of collaboration which IRMO could achieve. As noted earlier, improving the global collaboration between the supply chains is the selective code in this research, which represents the clue to improve the supply chain strategies. That it is why we focus now while developing IRMO to ensure that it will improve this global collaboration of the supply chains accordingly.
The role of this organization is to change the traditional collaboration, which we know now and reforming the buyer-supplier relationships, and engaging all the partners in a single global network, where all the members can interact effectively and responsively.

In other words, this proposal will contribute to enhance the lean strategy by being effective, and at the same time, it will help to improve the responsiveness of the supply chains, through global collaboration with all the business partners, and this definitely plays very important role to improve the agile strategy across the supply chains. The leagile strategy could work better with this proposal, however, the global collaboration which could be achieved by IRMO will enable the supply chains to achieve the required balance between lean and agility in order to have leagile strategy successfully.

In times of rapid changes in the markets, there is no way to survive without alliance with other partners. This could turn the risks to opportunities and improve the competitive advantages of the supply chain [69]. IRMO aims to help the supply chains to form this alliance with reliable partners. Right now, there is no entity to play this role, but the companies always try to search for partners overseas through different ways, like:

- Searching on the internet for companies selling or buying their products.
- References from other business partners to work with a specific company based on previous experience.
- Business trips to other locations to visit companies seeking partnerships.
- Participating in associations gathering companies from the same industry.

There are some entities currently trying to work as a data bank and connecting the companies to each other, like Ali-Baba, Amazon, or E-bay. But none of them gather all the information needed worldwide, they are either working at a local and regional scale, or working globally but with some information only, specifically, we can find this type in the e-procurement websites.

These multiple options of outsourcing and getting information about partners and products are not effective for the supply chains, because the information available always is limited in comparing with the entire business information globally. None of the associations or e-procurement websites have all the dates of the companies, products, and prices worldwide, but the companies usually search for what they need in different channels, and certainly this process is very time consuming and requires much effort to be done.

Inversely, IRMO has a very important advantage to allow the supply chains to depend on many sources easily. However, it is very risky to depend on single or limited sources. Some supply chains depend on limited sourcing options as a result of the difficulties associated with the process of building reliable business partners, but if we make this process easier, then the supply chain can depend on many reliable sourcing options, which can play a very important role to protect the supply chain from any sudden effect in the future.

For example, although Toyota is a pioneered company in lean strategy, in 1997, it depended on a limited sourcing channel to supply the brake parts, and suddenly, when a fire took place in that plant, Toyota production stopped accordingly and lost about 300$ million as a result of this practice [78]. This event was the trigger for Toyota to implement multiple sourcing channels after that.

To sum up, the aim of the IRMO is to improve the supply chain strategies by saving this time and effort for the supply chains, where we have all the information in a single data bank, all the information is reliable and trustable as they are extracted from legal companies only worldwide. This trust is very crucial point for the partnership, and practically it is not easy to be attained [79], but by IRMO, this will be easier.

4.7. Unique Character of IRMO

All the other outlined organizations and associations are different from the proposed IRMO. The World Trade Organization or the International Chamber of commerce, for example, are not playing
the same role as described above, as they have other functions and goals. IRMO is also different from the existing e-procurement websites on the internet from various areas, namely:

- IRMO is a legal body under the umbrella of the United Nations, while the e-procurement websites are operated privately.
- IRMO is a non-profit organization funded by the United Nations, while the e-procurement websites are for profit mostly and depend on subscriptions, percentage of each deal, and advertising opportunities on the site.
- IRMO is not a place of making deals, but just a data bank of information, which is in contrary of the websites of buying and selling any products—for example, E-buy, Amazon, or Alibaba.
- IRMO works globally to generate master data for the entire business worldwide, because the data base of IRMO is built on including all the information provided by the governments about all the companies operating legally in each country. In the e-procurement websites, the subscription is a choice for each company, so these sites are always limited in terms of participants.
- There is no guarantee about the liability of the companies participating in the e-procurement websites, any fake company can register and scam the people. IRMO is a United Nations organization, so only the legal businesses in each country are listed. Thus, there is no risk at all of dealing with fake or deceiving companies, but all the participants are real companies operating legally.

IRMO should utilize the evolution of the information technology to create its data base and to organize massive amount of data received from each part of the world. This will enable the users to have innovative features in the system, while searching, refining, and extracting the data they need within minutes.

4.8. Functions of IRMO

In terms of identified functions of IRMO, we are outlining improving supply chain strategies utilization by facilitating collaboration, legal function, and function of a global data bank. Those functions are further elaborated below.

4.8.1. Improving the Supply Chain Strategies Utilization by Facilitating the Collaboration

IRMO can play very important role to improve lean, agile, and leagile strategy utilization and this can be done by facilitating the global collaboration between all the supply chains worldwide. It should be designed to facilitate the collaboration on a large scale globally by recording all the data of the companies in each industry worldwide and enabling the companies to know each other in terms of products, services, and prices.

4.8.2. Legal Function

As information technology has now changed the practice of sourcing overseas, the risk of commercial fraud also has increased, especially for companies working illegally, or in terms of quality of products and services. This is in addition to the financial transactions worldwide.

IRMO will gather all the data for the legal organizations only, so any illegal business cannot participate in this organization. The definition of the legal business is to comply with the local law of the country of operation. This is to ensure the liability of trading between the parties and also to restrict the illegal business from competing to the legal one.

IRMO should be related to the United Nation and working as a UN specialized agency, however most of the countries worldwide are members in the UN. IRMO's function is to allow the companies to get reliable data about each other and to save the time, which all the supply chains always spent to search for suitable outsourcing solutions. However, all the information of the potential business partners will be presented clearly, so the companies can communicate and interact perfectly.
4.8.3. Global Data Bank

IRMO will work as a comprehensive data bank for all the companies worldwide. It will be the official source of information, on which the supply chains can depend on to do business. IRMO is not a private company, but a non-profit organization and working under the umbrella of the United Nations. The UN now has many specialized agencies such as, World Health Organization, or International Labor Organization. IRMO should act as a UN specialized agency also working specifically to improve the global sourcing process which will add value at the end to all the nations.

4.9. Preconditions for Establishing IRMO

According to the UN charter, which is the foundation treaty of the UN, the United Nations Economic and Social Council acting under Articles 57 and 63 is responsible for incorporating a new agency to the UN, as stated in Article 63 [80]. Such agreements shall be subject to approval by the General Assembly.

A list of all the specialized agencies of the UN which we propose IRMO to be included is available from this UN website in this link https://www.un.org/en/sections/about-un/funds-programmes-specialized-agencies-and-others/index.html.

4.10. The Structure of IRMO

The author proposes establishing this organization under the umbrella of the United Nations. The head office could be in New York—USA with regional offices in each continent, as proposed below:

- Europe: Antwerp—Belgium
- North America: Houston—USA
- South America: Rio de Janeiro—Brazil
- Africa: Cape Town—South Africa
- Asia: Shanghai—China
- Australia: Sydney

We nominated these cities because each one represents a hub in its region for international business, especially from the viewpoint of supply chain activities.

In each country worldwide as well, there will be an office to gather all the information needed perfectly. This country office should liaise with the local chambers of commerce to get updated information always. The reason for proposing the chamber of commerce in this regard is because the chambers are reliable sources of information in each country, since they are established to gather all the companies operating legally in any country in one body under the observation of the governments.

4.11. Key Processes in IRMO

As IRMO has a global nature, the process design should start first from the member countries individually, refined and verified to ensure the reliability of the information before moving to the international level, which has the master data of all the legal companies worldwide.

The purpose of these key processes is to facilitate the collection of data and achieve the maximum benefits to all the members of IRMO to utilize these data perfectly. This process will contribute directly to achieve the required global collaboration and interaction between all the supply chains worldwide. Once this global collaboration is optimized, the supply chain strategies will be improved directly.

The key processes in IRMO are outlined below:

- The country offices should gather all the information nationwide in collaboration, via the local chambers of commerce. Each chamber of commerce has the information of the companies working in the country. Thus, we ensure that participants are all officially registered in the countries they operate in.
• The information should include all the details of the legal companies, products, quality, and prices. This will be included in a specific template to ensure that all the information is organized always on the same format. Each company in the chamber of commerce has a registration number and this is a unique number for each organization to avoid any conflict. In the commercial registration of each company, there is already information about the products categories subject of business. Each company should provide the portfolio of detailed products and prices for marketing purposes.

• It will be the responsibility of each country office to verify the information and refine them perfectly to have an up-to-date record, and the coordination with the local chamber of commerce in each city can play a very important role to update the information perfectly. It is expected from the chambers of commerce to show a high level of cooperation with IRMO as a UN agency.

• The country office should classify the companies and products in a directory to be easy for selection and searching. This is one of the main responsibilities of IRMO, to present the massive amount of information in a portal, which can be used easily by the members.

• This information should be updated to the regional office of IRMO periodically. This is a very important step to have up-to-date information always regionally and globally as well.

• The information in the regional offices should be reported to the head office globally, thus we can have a single directory containing all the information required for outsourcing globally, and the companies can easily reach the best outsourcing solutions in each industry, within minutes, instead of searching for such a long time and at the end. No company can survey all the available sources globally, but it will reach some only. With using the proposed IRMO, any company can build reliable business relationships very easily and quickly. The system of IRMO enables the companies to survey all the outsourcing solutions worldwide and nominate the best within minutes.

In the figure below, we can see the core concept of the proposed framework—IRMO, where the input are the supply chain strategies, namely lean, agility, and then leagility. If this input is combined with the supporting tool (i.e., IRMO), this will lead to flexible sourcing and improved suppliers’ responsiveness, and this will help to achieve significant improvement in supply chain collaboration, which will help to generate output of optimized supply chain strategies. So, the implementation of the framework will help to enrich the supply chain strategies utilization in fact.

4.12. Financing IRMO

We recommend IRMO to be established as a UN specialized agency, and the financial support of IRMO to be from the UN directly, where the 11 member countries in the UN pay their shares, and the UN utilizes the same for all its activities, and the IRMO will be part of the UN activities, similarly like other organizations currently working under the umbrella of the UN.

IRMO will be a non-profit organization and act as agency in the UN, so all the finance will be from the UN, no profit is expected to be achieved against the service which IRMO provides to the global economy. Figure 1 outlines IRMO.
IRMO will be a non-profit organization and act as agency in the UN, so all the finance will be from the UN, no profit is expected to be achieved against the service which IRMO provides to the global economy. Figure 1 outlines IRMO.

5. Validation of Developed Framework

In this section, we present the research findings from the second phase of the interviews among supply chain professionals, where they aimed to assess the proposed framework and related IRMO. Particularly, we address the propositions clearly in the questions to see the feedback of the supply chain professionals about the proposed framework, which we designed specifically to support the supply chain strategies utilization under severe conditions.

We made another phase of interviews with the same participants of the first phase. We listened to their feedback in the first phase and built the proposed framework to fulfill their needs. In the second phase, we present the framework to them to see how they evaluate it.

After developing the proposed framework, it was important not just to develop a theoretical framework, but also to listen to the practical voice of the supply chain professionals, what they think about this framework, like if it can help the supply chain strategies to sustain and work better in the future really or not. Table 7 outlines the questions and results about framework validation by supply chain professionals.
In this section, we outline the impact of the proposed framework on lean, agile, and leagile strategies utilization in the frame of supply chain management, while also considering the current health and economic crisis.

As outlined above, this is based on the cognitions from our research, where it becomes evident that lean, agility, and leagility are key strategies for the supply chain management. The challenge here for the business is to develop a single strategy, which can be implemented globally and support the individual business strategies in each country [81]. IRMO represents this global framework, which supports the lean, agile, and leagile strategies utilization by the individual organizations worldwide.

Ref [82] believe that, if we develop a global strategy, it must contain standardized rules and deploy the same to all countries. From this centralized concept, the proposed framework within the organization works to standardize the process of global sourcing, facilitating the collaboration, and deploying the same to firms as a supporting tool to their lean, agile, and leagile strategies utilization.

Ref [83] believe that the main focus of the agile supply chain is to make the proper interface between the supply chain and markets. As described in the above points, the framework will help the supply chain to be cost effective, and this is the core idea of the lean strategy.

The key factor of controlling the cost in the future is related directly to the ability of the supply chain to find cheaper sources of raw materials. That is why all the multinational companies nowadays are concentrating on China and India to outsource the raw materials and sometimes to establish productions plants over there in order to enjoy the cheap workforce and raw materials as well.

In the literature, many authors strongly believe that lean strategy essentially needs a special type of partnership with the suppliers and working collaboratively upstream the supply chain [84–86]. This is the core idea which the framework tries to present.

For the agile strategy, the framework will play a very fatal role to accelerate the activities of the supply chains. First, the outsourcing process will be done quicker, since currently it is a very time-consuming task. However, until the supply chain finds sources of supply, evaluates them, and selects reliable partners, the stock level in most cases becomes critical until the new stock is shipped and arrived. Consequently, this is affecting the ability of the company to supply on time, and there is always a possibility of losing part of the market to the other competitors as a result of delaying
the supply to customers. IRMO can help the supply chains to overcome this risk and supply on time always, because we shorten the time needed for outsourcing, and consequently, we accelerate all the other functions of the supply chain as well. The raw materials are available on time; the other functions of the supply chain can work perfectly such as production, sales, and distribution.

For the leagile strategy, the framework can help to implement the postponement technique very effectively. As described above, the supply chains can eliminate the stock level because all the sources of supply are available always, and based on that, each company can postpone the assembly till the last moment while the demand appears downstream the supply chain.

5.2. Possible Benefits of IRMO to the Supply Chains and the Global Economy

The proposed framework and related IRMO creates many benefits for the global economy in general and especially to the operations of supply chains as a result of having multiply reliable sourcing options, which will improve the flexibility across the supply chains and consequently, the lead time of delivery as well [87,88]. Several benefits for the framework and related IRMO are outlined below.

Benefits for the industry will be following:

- It will eliminate the time needed to search for business partners, and will provide a very wide range of suppliers and/or customers in each industry, since the data bank will contain all the information of the companies worldwide.
- It will reduce the time needed for building trust between two partners, and this is because all the companies registered in the data base must be legal companies. Accordingly, there is no risk of dealing with unknown partners, but only the reliable companies operating legally will be registered in the database.
- It can help the supply chains to achieve the ultimate level of collaboration, with the selected business partners.
- It will be helpful, since all the supply chains worldwide can maintain a lower inventory level, because there is no risk of stocking out for the suppliers of any material. There will be always alternative options available in the data base, which is ready to supply immediately. This can represent alternative sourcing channels over time, so consequently the supply chains can reduce the inventory level and safety stock.
- The supply chains can operate effectively by eliminating the cost as much as possible. The data base will present all the companies in each industry with products and prices, so the decision maker can select always the best economical option.
- It will help the global economy to achieve the fair competition practice, however, all the companies can compete fairly by presenting their products and prices in the data base for all customers, and at the end, the customer can select which option is convenient to him.
- It will not only help the supply chains to reduce the cost of materials, but also to reduce the operational cost of the supply chain activities. However, we eliminate the time needed for searching for reliable partners and the time needed for outsourcing as well. Thus, the supply chains can hire limited number of procurement employees, and consequently the cost of human resources will be reduced also.
- It will play a very important role to control the prices of the commodities worldwide. IRMO will not do this function originally, because it has no power to instruct the companies to identify the prices of their products, but this will come automatically as a result of the fierce competition between all the companies worldwide. Each company will realize that the data base of IRMO contains all its competitors—not only regionally but worldwide—so each company will be very competitive to win the orders. The buyers always will have extreme scale of selections, and if the seller is not offering competitive prices, the buyer can get the material from another source easily. This competition will work always as (automatic controlling agent) of the prices.
• It can help to achieve significant improvement of the international trade. However, many companies used to get their raw materials from traditional sources of supply for decades, they do not know that there are so many alternative sources of supply, which may be much more economical for them. Some traditional companies also do not want to face a risk of trying new suppliers, or they do not have time to search for that. Finally, they discover that the new suppliers are not reliable enough, so they prefer the traditional sources which they deal with for years to avoid this risk. With the existence of IRMO, the sourcing process will be much easier and the companies can choose the best sources of supply always, and this will help the global economy to increase the international trade massively.

• As a result of the improvement of the international trade, the logistics industry could be the best beneficiary. Moving the materials locally and internationally will help the logistics industry to grow rapidly. If the companies can get cheaper sources of raw materials overseas than what they have locally, the international shipping industry can achieve significant improvement in that case.

Benefits for the society and global economy will be following:

• It will optimize the usage of the resources globally by better organization of the outsourcing channels. However, limited resources, especially during difficult times, need perfect control in order to share these resources together [89].

• It will help the world to achieve the best utilization of the nature resources available for mankind. As a matter of fact, we waste too much resources nowadays, because of the conflict goals of the different countries and thousands of supply chains. Each party looks for its immediate benefit only, without caring for the entire resources we have in the planet. When we have a single organization gathering all parties together in one entity, certainly we can utilize the limited resources of the planet in a better way.

• It can help the global economy to create more jobs as a result of improving international trade. The global economy is a chain of activities, and each activity affects the others directly or indirectly. If the international trade is improved, the production and logistics also will be improved as a result of that, consequently more jobs can be created, and much buying power will be added to the markets because the income of the new jobs will be spent in the markets again. This will increase the overall demand of the global economy entirely. It is a circle connected, so the similar concept of the supply chain is also applicable for the global economy.

• It can help the global economy prevent illegal business. As long as we have a single data base for legal businesses, we can recognize any illegal business very easily. The registration in IRMO will work as prequalification for any company worldwide, and thus any illegal business will not have the opportunity to work or operate on a large scale. Certainly, the illegal businesses will be there always, as long as we live on this planet, but it will not be as strong as what we currently have. IRMO will play a very important role to reduce the volume of illegal business significantly.

To sum up, we found major support for our framework, which adds practical validation to our framework in fact. The aim of the IRMO is to improve the supply chain strategies by saving this time and effort for the supply chains, where we have all the information in a single data bank, all the information is reliable and trustable as they are extracted from worldwide legal companies only.

5.3. The Contribution of IRMO to the UN’s Sustainable Development Goals

In September 2015, the General Assembly of the UN adopted the agenda for sustainable development, containing 17 Sustainable Development Goals (SDGs). A complete list of these 17 goals could be found on the UN official website [90], while each goal has several targets and indicators [91]. Here, we present the relationship of our framework to the SDGs, particularly our framework may contribute to the following goals, namely: (1) Goal No. 7—Affordable and clean energy; (2) Goal No. 8—Decent work and economic growth; (3) Goal No. 9—Industry, innovation, and infrastructure; and (4) Goal No. 17—Partnership, to achieve SDGs based on building global partnership.
More precisely, since our framework helps to improve the lean supply chain strategies, one of the major aspects to any lean supply chain is affordable energy and getting it from clean sources could help to reduce the cost of energy in the industries since we will have various sources of energy and not depend mainly on oil like now. This will help realization of Goal No. 7.

When IRMO helps to improve the global sourcing process, it definitely contributes to the world economic growth (Goal No. 8) and helps the industries and innovation, as stated in the targets of Goal No. 9, “Significantly increase access to information and communications technology and strive to provide universal and affordable access to the Internet” [90]. IRMO is built on global collaboration and the idea of global partnership is the core concept of Goal 17, one of the main targets of this goal is to promote universal rules of trade [90] and this is in fact based of how IRMO works.

All the remaining SDGs are in fact related to each other, directly to indirectly, as explained by [92], which mapped the SDGs and presented the interrelationships accordingly. Thus, when we present the relationship of our framework to the above mentioned four goals, this is in fact a direct relationship, but consequently, our proposed framework contributes to the remaining SDGs indirectly.

5.4. The Proposed Framework and the Current Health and Economic Crisis

The developed framework can support the supply chain strategies to work better in the future, especially in difficult circumstances during the crisis time, and achieving the sustainable supply chain strategies accordingly. Any effort aiming to improve the situation will be highly recommended, so we believe that the creation of this framework can help the supply chains to overcome most of the problems expected as a result of the health and economic crisis resulting from the coronavirus in 2020, it can create a new future for the supply chains.

When resources are limited at the time of crisis and there is difficulty to supply, there is a need for a special type of collaboration to organize these limited resources in order to reduce the negative impact of the crisis and allow all the supply chains to reach each other quickly, easily, and with reliability as well. To be reliable, there must be quick action always to adopt to the changes in the markets. “To be reliable in uncertain and changing environment, firms must be able to quickly respond to changes” [66] (p. 823).

The proposed framework can play this role to help the firms respond quickly to the changes of the business environment in the presented scenarios as explained below.

When the resources are limited, not all the supply chains can keep up with this new situation. The sourcing options will be limited as well and the supply chains could face difficulties in the process of sourcing significantly. In these circumstances, IRMO can play a very important role to improve the sourcing process, as all the supply chains can meet and interact in one platform.

If any supply chain loses a supplier because it cannot sustain its business in the current health and economic crisis, it can easily find another source through IRMO. The same is applicable also for losing customers, the supply chains can get other customers through IRMO easily. IRMO is mainly concerned with the resources management globally, and when we have limited resources, it becomes compulsory to manage these limited resources with what we have in order to survive in the future. This variety of suppliers and customers will help the supply chains to find always alternative sources of material.

Some business can survive and adapt with the new health and economic challenges, and others maybe not. Consequently, the entire portfolio of buyers and suppliers will change in the marketplace, so it is essential for any supply chain to be adaptable and flexible enough for these changes. IRMO will help the supply chains to achieve this flexibility by changing their portfolios of suppliers and customers quickly, easily, and on a global scale.

In frame of the current health and economic crisis, there are lot of troubles for logistics supply of materials due to restrictions worldwide, and also because of the impact of the coronavirus on the financial statement of the nations. This will create much pressure for any supply chain to source the raw materials, and to deliver the finished products to the end customers. Many suppliers and customers may not be able to continue doing business in these circumstances. IRMO could help the
supply chains to reduce the impact of this scenario by facilitating the process of finding alternative suppliers and customers.

The logistics difficulties will be a major challenge also for the logistics service providers such as shipping lines, freight forwarders, land transporters, and customs brokers. There will be challenges to create alternative routing of the shipments to deliver the materials. The ability of the supply chain to find reliable logistics service providers in these conditions is a key success factor to operate the supply chain at the current time. IRMO could be very useful for the supply chains to find the right logistics partners, who can provide innovative solutions.

As IRMO will have the data base for the logistics service providers and not only materials, this will enable the supply chains to have master data for the logistics providers worldwide.

IRMO will help improve supply chain management under the current health and economic crisis. In the future, whether the global economy returns to normal status or faces a difficult time, IRMO will definitely help in all cases, and this will consequently have a direct impact on improving supply chain strategies utilization.

IRMO can help the supply chains to stay lean, if the resources are limited, or within a financial crisis. The common impact of all these scenarios, they will all lead to major changes in the global market, and to adopt with these major changes of the market, there should be a very high level of flexibility to the supply chain strategy. This flexibility is provided by IRMO, as it will provide the supply chains always with massive amounts of data to utilize alternative energy providers, alternative suppliers and customers for materials and logistics service providers as well. Thus, the supply chain strategy can manage any difficult scenarios effectively. Reaching these parties quickly is one of the core principles of the agile strategy and thus IRMO can help the supply chains to stay agile within these scenarios.

The fluctuation of demand is very high within these scenarios, and IRMO will help the supply chains to switch their operations between lean and agile strategies whenever needed and achieve the required balance of the leagile strategy.

6. Conclusions

The cognitions above reveal that any supply chain cannot successfully operate without a clear strategy. While the lean strategy is very important for waste elimination, it was criticized that it does not give enough attention to the time factor in the supply chain. Accordingly, the agile strategy is developed to take care of the speed and flexibility of the supply chain, but it was also criticized that it does not give full attention to the cost control as lean strategy does. Recently, a merge happened between both lean and agility to create a combined strategy of “leagility” in order to utilize the benefits of both strategies together and overcome weakness points.

These strategies are very useful for the supply chains and played a very important role for drawing the best practice of supply chain management, but there are many factors and future events, which most probably will happen to the business environment which put all the supply chains in severe conditions, these factors may make the current known strategies not effective enough as needed.

After using interviews and grounded theory as research methods, it was found that the supply chain strategies are useful in fact, but the supply chain professionals are worried about the future challenges and the ability of lean, agility, and leagility to sustain and work in the severe conditions. They expressed these concerns mainly related to the global sourcing process, which needs supporting tools to work better in the future. There is a need for an innovative approach to draw a new framework of supply chains management facilitating the global collaboration. This new framework should be able to face difficult times and eliminate the negative consequences resulting from the severe conditions of the economy.

Based on interviews with supply chain professionals and following the principles of grounded theory research [51,61,70], the result of this phase of research was a developed framework for supply chain strategies utilization under different circumstances and adjacent IRMO. The author proposed
establishing a new organization—IRMO under the umbrella of the UN to facilitate the collaboration process between the supply chains worldwide, and to organize the resources, which we have globally in a systematic manner, ensuring the supply chains obtain the best benefit, and to the global economy as well.

After developing the proposed framework, it was important not just to develop a theoretical framework, but also to listen to the practical voice of the supply chain professionals, what they think about this framework, like if it can help the supply chain strategies to sustain and work better in the future really or not.

For that purpose, a second phase of research is done for testing and validating the proposed framework. We conducted the interviews among supply chain professionals accordingly. It was found that the proposed framework is very useful if it is implemented and the supply chain professionals believe that it can help the supply chains strategies to face the future challenges of the global markets. They also proposed some possible modifications and improvement areas which adhered accordingly in order to enhance robustness of the framework.

By implementing this approach, we believe that the framework, with its embedded organization IRMO, can add value to all the supply chains worldwide and represent a very supportive tool of global collaboration. Thus, if we add this innovative tool to the current strategies we have, lean, agility, and leagility, they can work better to face the difficult times expected in the global markets in the future.

6.1. The Limitations of the Research

The main limitation of this research is related to the focus on three key strategies of the supply chain; lean, agility, and leagility, as the three most commonly used supply chain strategies, while other possible strategies are not considered in our research. For instance: six sigma, total quality management, or customer relationship management. Second, the limitation on supply chain collaboration, as the proposed approach is focused on developing a new framework to support the supply chain strategies utilization in the future, but it is not designed to research the internal collaboration between the employees of any company. It is limited to research on the global collaboration in order to develop a supportive framework for managing the global supply chains. If we use this framework along with any of the current supply chain strategies, lean, agile, or leagility, we can work better to face future market trends.

There might be some potential drawbacks arising from the global financial, health crisis (i.e., due to COVID 19) and decisions of the politicians in terms of implementing IRMO. The core idea of the framework is based on global collaboration, and the politicians always have very complicated measures before they decide to collaborate with other countries or alliances globally. At the end, the role of the researchers is to suggest the proposed framework, without influence if the political decision makers will follow our proposals or not. Another drawback can be related to the large number of sourcing companies in the database, their diversity, political crises, regular verification of fulfilling various standards, inclusion of “fake organizations”, etc.

Finally, also the current situation caused by COVID 19 may hamper the realization of the proposed idea. We estimate, that under “normal circumstances”, IRMO can be realized and/or established in 12 months, although, the current COVID 19 and crisis situation will seriously impede this process on one hand, as the focus will be on other priorities. But, on the other hand, due to the crisis, it may also happen that the focus will be shifted toward enhancing global sourcing process in these severe times, to help organizations to secure their requirements of materials smoothly.

6.2. Recommendations for Further Research

Further research can be found in various areas, First, regarding supply chain strategies, as the global markets are always moving dynamically, there will be a need for further research on the recommended strategies, which can be suitable for those changes in the markets. Accordingly, supply chain strategies utilization is a wide topic for future research. Second, global collaboration is considered as central
topic for the supply chain of the future, so it should be a subject for further research. The researchers are encouraged to develop new approaches of global collaboration and innovative ways to work with other business partners worldwide. However, improving global collaboration will help to improve the supply chain practice directly, which is the aim of any business. Third, if the proposed IRMO is established, it will be highly recommended to have further research about the impact of the practical activities of this organization to supply chain management. It also will be recommended to research the impact of the organization on the global economy entirely. This will be a very rich topic for future research related to the activities of the organization, processes, areas of potential improvements, and best practice. Finally, the challenges related to the management of a large number of suppliers in the database, their adherence to various standards, etc., should be further examined.

Author Contributions: Conceptualization, W.R.; methodology, W.R., Z.N.; validation, Z.N.; formal analysis, W.R.; investigation, W.R.; resources, W.R.; data curation, W.R.; writing—original draft preparation, W.R., Z.N.; writing—review and editing, Z.N.; visualization, W.R.; supervision, Z.N.; project administration, Z.N.; funding acquisition, W.R. All authors read and agreed to the published version of the manuscript.

Funding: The authors acknowledge the project “Entrepreneurship for Innovative Society” (P5-0023) (financially supported by the Slovenian Research agency).

Conflicts of Interest: The authors declare no conflict of interest.

References
1. Jaya, S.; Kumar, A. Impact of supply chain management strategies on changing market condition. IOSR J. Bus. Manag. 2016, 18, 109–111.
2. Cohen, M.A.; Lee, H.L. Designing the right global supply chain network. Manuf. Serv. Oper. Manag. 2020, 22, 15–24. [CrossRef]
3. Christopher, M. Logistics and Supply Chain Management; Pitman Publishing: London, UK, 1992.
4. Christopher, M. Logistics and Supply Chain Management: Creating Value, Adding Networks, 3rd ed.; Pearson Education Limited: London, UK, 2005.
5. Womack, J.; Jones, D.; Roos, D. The Machine that Changed the World: The story of Lean Production; Rawson Associate: New York, NY, USA, 1990.
6. Christopher, M.; Towill, D. An integrated model for the design of agile supply chains. Int. J. Phys. Distrib. Logist. Manag. 2001, 31, 235–246. [CrossRef]
7. Jones, M.R.; Naylor, B.; Towill, D. Engineering the leagile supply chain. Int. J. Agil. Manag. Syst. 2000, 2, 54–61.
8. Christopher, M.; Towill, D. Developing market specific supply chain strategies. Int. J. Logist. Manag. 2002, 13, 1–14. [CrossRef]
9. McCullen, P.; Towill, D. Practical ways of reducing bullwhip: The case of the Glosuch global supply chain. Int. J. Oper. Manag. 2000, 26, 24–30.
10. Bala, K. Supply chain management: Some issues and challenges—a review. Int. J. Curr. Eng. Technol. 2014, 4, 947–953.
11. APICS. Supply Chain Strategy Report: Make The Most of Supply Chain Strategy, Apics Supply Chain Council. 2016. Available online: http://www.apics.org/docs/default-source/toc-pdfs/strategy-report-short.pdf (accessed on 28 August 2020).
12. Potocan, V.; Mulej, M.; Nedeľko, Z. How economic crises effect employees’ attitudes towards socially responsible behavior—Case of Slovenia. Special issue on Corporate Social Responsibility and Business Ethics in Central and Eastern Europe. J. East Eur. Manag. Stud. (JEEMS) 2019, 152–178. [CrossRef]
13. Ryan, M.J.; Eyers, D.R.; Potter, A.T.; Purvis, L.; Gosling, J. 3D printing the future: Scenarios for supply chains reviewed. Int. J. Phys. Distrib. Logist. Manag. 2017, 47, 992–1014. [CrossRef]
14. Liu, T.; Woo, W.T. Understanding the US-China trade war. China Econ. J. 2018, 11, 319–340. [CrossRef]
15. Lukin, A. The US–China trade war and china’s strategic future. Survival 2019, 61, 23–50. [CrossRef]
16. Hoyt, J.; Huq, F. From arm’s length to collaborative relationships in the supply chain; an evolutionary process. Int. J. Phys. Distrib. Logist. Manag. 2000, 30, 750–764. [CrossRef]
17. Monczka, R.; Morgan, J.; Trent, R.; Handfield, B. Purchasing and Supply Chain Management; South-Western: Cincinnati, OH, USA, 1998.
18. Peters, J.; Hogensen, A. New directions for the warehouse. *Suppl. Chain Manag. Rev.* **1999**, *23–25*.  
19. Chandra, C.; Kumar, S. Enterprise architectural framework for supply-chain integration. *Ind. Manag. Data Syst.* **2001**, *101*, 290–304. [CrossRef]  
20. Slack, N.; Lewis, M. *Operation Strategy*, 2nd ed.; Prentice Hall, Pearson Education: London, UK, 2008.  
21. Slack, N.; Brandon-Jones, A. *Operations and Process Management: Principles and Practice for Strategic Impact*; Pearson: London, UK, 2018.  
22. Kalafus, R.M. *The Innovative Society: Five Essential Conditions for Fostering Innovative Activity*; Infinity Publishing: West Conshohocken, PA, USA, 2014.  
23. Fan, D.; Li, Y.; Chen, L. Configuring innovative societies: The crossvergent role of cultural and institutional varieties. *Technovation* **2016**, *66*, 43–56. [CrossRef]  
24. Wu, Y.; Wang, J.; Li, C. Decisions of supply chain considering chain-to-chain competition and service negative spillover effect. *Sustainability* **2019**, *11*, 1612. [CrossRef]  
25. Milovanović, G.; Popović, G. The hyper-personalized supply chains. *Industry 4.0* **2019**, *4*, 124–127.  
26. Christopher, M. *Logistics and Supply Chain Management*, 4th ed.; Pearson Education Limited: London, UK, 2011.  
27. Gunasekaran, A.; Lai, K.; Cheng, T. Responsive supply chain: A competitive strategy in a networked economy. *Int. J. Manag. Sci.* **2008**, *36*, 549–564. [CrossRef]  
28. Nel, J.D.; Badenhorst-Weiss, J.A. Theoretical guidelines to manage agile supply chains. *Eur. J. Bus. Soc. Sci.* **2015**, *4*, 136–150. [CrossRef]  
29. Soltan, H.; Mostafa, S. Lean and agile performance framework for manufacturing enterprises. *Procedia Manuf.* **2015**, *2*, 476–484. [CrossRef]  
30. Simchi-Levi, D.; Kaminsky, P.; Simchi-Levi, E. *Designing and Managing the Supply Chain: Concepts, Strategies and Case Studies*; McGraw-Hill: Boston, MA, USA, 2009.  
31. Gligor, D.M.; Esmark, C.L.; Holcomb, M.C. Performance outcomes of supply chain agility: When should you be agile? *J. Oper. Manag.* **2015**, *33*, 71–82. [CrossRef]  
32. Wu, K.J.; Tseng, M.L.; Chiu, A.S.; Lim, M.K. Achieving competitive advantage through supply chain agility under uncertainty: A novel multi-criteria decision-making structure. *Int. J. Prod. Econ.* **2017**, *190*, 96–107. [CrossRef]  
33. Naylor, J.; Naim, M.; Berry, D. Legality: Integrating the lean and agile manufacturing paradigms in the total supply chain. *Int. J. Prod. Econ.* **1999**, *62*, 107–118. [CrossRef]  
34. Aberdeen Group. The Lean Supply Chain Report. Available online: http://peakindiana.com/resources/Lean+Supply+Chain+Rpt.pdf (accessed on 14 August 2020).  
35. Chen, T. A systematic cycle time reduction procedure for enhancing the competitiveness and sustainability of a semiconductor manufacturer. *Sustainability* **2013**, *5*, 4637–4652. [CrossRef]  
36. Vijayashree, M.; Uthayakumar, R. Inventory models involving lead time crashing cost as an exponential function. *Int. J. Manag. Value Supply Chain*. **2016**, *7*, 29–39.  
37. Chapman, S.; Arnold, T.K.; Gatewood, A.K.; Clive, L. *Introduction to Materials Management*, 8th ed.; Pearson: London, UK, 2016.  
38. Christopher, M.; Ryals, L.J. The supply chain becomes the demand chain. *J. Bus. Logist.* **2014**, *35*, 29–35. [CrossRef]  
39. John, G. The Changing Face of Supply Chain Risk Management, Scm World. 2015. Available online: http://www.scmworld.com/wp-content/uploads/2017/01/The-Changing-Face-of-Supply-Chain-Risk-Management.pdf (accessed on 28 August 2020).  
40. Juttner, U.; Peck, H.; Christopher, M. Supply chain risk management: Outlining an agenda for future research. *Int. J. Logist. Res. Appl.* **2003**, *6*, 197–210. [CrossRef]  
41. Meixell, M.; Gargeya, V. Global supply chain: A literature review and critique. *Transp. Res. Part E* **2005**, *41*, 531–550. [CrossRef]  
42. New, S. There maybe troubles ahead. *Supply Manag.* **2003**, *8*, 16–20.  
43. Pourhejazy, P.; Kwon, O.K.; Chang, Y.T.; Park, H.K. Evaluating resiliency of supply chain network: A data envelopment analysis approach. *Sustainability* **2017**, *9*, 255. [CrossRef]  
44. Pfohl, H.C.; Yahsi, B.; Kurnaz, T. Concept and Diffusion-Factors of Industry 4.0 in the Supply Chain. Available online: https://www.researchgate.net/publication/308103066_Concept_and_Diffusion-Factors_of_Industry_40_in_the_Supply_Chain (accessed on 14 August 2020).
45. Geunes, J.; Pardalos, P.; Romeijn, H. Supply Chain Management, Models, Applications, and Research Directions; Kluwer Academic Publishers: Dordrecht, The Netherlands, 2002.
46. Miah, M.R.; Roy, H.N.; Saha, S.; Parvez, M.S.; Alom, M.J.; Dhar, N.R. Is agile supply chain suitable for apparel manufacturing organizations? A multicriteria decision making perspective. Int. J. Sci. Eng. Res. 2013, 4, 933–938.
47. Li, L. Managing Supply Chain and Logistics: Competitive Strategy for a Sustainable Future. Available online: https://www.amazon.com/Managing-Supply-Chain-Logistics-Competitive/dp/9814602426 (accessed on 14 August 2020).
48. Adamczyk, S.; Bullinger, A.C.; Möselin, K.M. Innovation contests: A review, classification and outlook. Creat. Innov. Manag. 2012, 21, 335–360. [CrossRef]
49. Chen, W.; Shi, L. Nested partitions for large-scale optimization in supply chain management. In Supply Chain Management and Logistics: Innovative Strategies and Practical Solutions; CRC Press: Boca Raton, FL, USA, 2015; pp. 123–150.
50. Lehmacher, W. The Global Supply Chain: How Technology and Circular Thinking Transform Our Future; Springer: Berlin/Heidelberg, Germany, 2017.
51. McCallin, A. Designing a grounded theory study: Some practicalities. Nurs. Crit. Care 2003, 8, 203–208. [CrossRef]
52. Strauss, A.; Corbin, J. Basics of Qualitative Research: Grounded Theory Procedures and Techniques; SAGE: Newbury Park, CA, USA; London, UK, 1990.
53. Glaser, B. Theoretical Sensitivity, Advances in the Methodology of Grounded Theory; Sociology Press: Mill Valley, CA, USA, 1978.
54. Burrell, G.; Morgan, G. Sociological Paradigms and Organizational Analysis; Ashgate Publishing Company: Hants, UK, 1979.
55. Li, X.; Du, J.; Long, H. Green development behavior and performance of industrial enterprises based on grounded theory study: Evidence from China. Sustainability 2019, 11, 4133. [CrossRef]
56. Sun, H.; Wu, S.; Li, Y.; Dai, G. Tourist-to-tourist interaction at festivals: A grounded theory approach. Sustainability 2019, 11, 4030. [CrossRef]
57. Fetterman, D.M. Excellence and Equality: A Qualitatively Different Perspective on Gifted and Talented Education; SUNY Press: Albany, NY, USA, 1988. Available online: https://www.amazon.com/Excellence-Equality-Qualitatively-Different-Perspective/dp/0887066410 (accessed on 28 August 2020).
58. Cohen, L.; Manion, L.; Morrison, K. Research Methods in Education; Routledge: Abingdon-on-Thames, UK, 2007. Available online: https://gtu.ge/Agro-Lib/RESEARCH%20METHOD%20COHEN%20ok.pdf (accessed on 28 August 2020).
59. Strauss, A.; Corbin, J. Basics of Qualitative Research Techniques; Sage Publications: Thousand Oaks, CA, USA, 1998.
60. McCracken, G. The Long Interview; SAGE: Newbury Park, CA, USA, 1988.
61. Johnson, J.S.; Sohi, R.S. Understanding and resolving major contractual breaches in buyer–seller relationships: A grounded theory approach. J. Acad. Mark. Sci. 2016, 44, 185–205. [CrossRef]
62. Manuj, I.; Mentzer, J.T. Global supply chain risk management strategies. Int. J. Phys. Distrib. Logist. Manag. 2008, 38, 192–223. [CrossRef]
63. Sangari, M.S.; Razmi, J.; Zolfaghari, S. Developing a practical evaluation framework for identifying critical factors to achieve supply chain agility. Measurement 2015, 62, 205–214. [CrossRef]
64. Smit, B. Atlas ti for qualitative data analysis. Perspect. Educ. 2002, 20, 65–75.
65. Rambaree, K. Three methods of qualitative data analysis using ATLAS ti: ‘A Posse Ad Esse’. In ATLAS ti User Conference 2013; Universitätsverlag der TU Berlin: Berlin, Germany, 2013; Volume 1, pp. 1–15.
66. Prater, E.; Biehl, M.; Smith, M. International supply chain agility: Tradeoffs between flexibility and uncertainty. Int. J. Oper. Prod. Manag. 2001, 21, 823–839. [CrossRef]
67. Joseph, R.; Thomas, H.; John, D. The Future of Supply Chain Management, Part II, Technology, Collaboration, Supply Chain Design. 2006. Available online: http://www.atkearneypas.com/knowledge/articles/2007/SCMR.Futures.Part2.pdf (accessed on 15 July 2017).
68. Rashad, W.; Gumzej, R. The information technology in supply chain integration: Case study of reda chemicals with elemica. Int. J. Supply Chain Manag. 2014, 3, 62–69.
69. Devor, R.; Graves, R.; Mills, J. Agile manufacturing research: Accomplishments and opportunities. IIE Trans. 1997, 29, 813–823. [CrossRef]

70. Böhm, A. Theoretical coding: Text analysis in grounded theory. In A Companion to Qualitative Research; Flick, D.U., von Kardorff, E., Steinke, I., Eds.; Sage Publications: Thousand Oaks, CA, USA, 2004; pp. 270–275.

71. Barratt, M. Understanding the meaning of collaboration in the supply chain. Supply Chain Manag. Int. J. 2004, 9, 30–42. [CrossRef]

72. Hudnurkar, M.; Jakhar, S.; Rathod, U. Factors affecting collaboration in supply chain: A literature review. Procedia Soc. Behav. Sci. 2014, 133, 189–202. [CrossRef]

73. Pramanik, R. Interorganizational Collaboration in Crisis Response Management: Exploring the Conditions for Improving Collaborative Behaviour across Organizational Borders; Division of Risk Management and Societal Safety, Lund University: Lund, Sweden, 2015.

74. Ralston, P. Supply Chain Collaboration: A Literature Review and Empirical Analysis to Investigate Uncertainty and Collaborative Benefits in Regards to their Practical Impact on Collaboration and Performance. Available online: https://lib.dr.iastate.edu/etd/13798/ (accessed on 14 August 2020).

75. Masson, R.; Isosif, L.; MacKerron, G.; Fernie, J. Managing complexity in agile global fashion industry supply chains. Int. J. Logist. Manag. 2007, 18, 238–254. [CrossRef]

76. Bruce, M.; Daly, L. Adding value: Challenges for UK apparel supply chain management. Prod. Plan. Control 2011, 22, 210–220. [CrossRef]

77. Sabath, R.; Fontanella, J. The unfulfilled promise of supply chain collaboration. Supply Chain Manag. Rev. 2002, 6, 24–29.

78. Nishiguchi, T.; Beaudet, A. Case study: The toyota group and the aisin fire. Sloan Manag. Rev. 1998, 40, 49–59.

79. McCutcheon, D.; Stuart, F. Issues in the choice of supplier alliance partners. J. Oper. Manag. 2000, 18, 279–301. [CrossRef]

80. UN. UN Charter. 2020. Available online: https://www.un.org/en/sections/un-charter/un-charter-full-text/ (accessed on 4 August 2019).

81. Yip, G. Total Global Strategy; London Prentice-Hall: Englewood Cliffs, NJ, USA, 2002.

82. Zou, G.; Cavusgil, S. The GMS: A broad conceptualization of global marketing strategy and its effect on firm performance. J. Mark. 2002, 66, 40–57. [CrossRef]

83. Vonderembse, M.; Uppal, M.; Huang, S.; Dismukes, J. Designing supply chains: Towards theory development. Int. J. Prod. Econ. 2006, 100, 223–238. [CrossRef]

84. Sako, M.; Lamming, R.; Helper, S. Supplier relations in the UK car industry: Good news—bad news. Eur. J. Purch. Supply Manag. 1995, 1, 237–248. [CrossRef]

85. Rich, N.; Hines, P. Supply chain management and time based competition: The role of the supplier association. Int. J. Phys. Distrib. Logist. Manag. 1997, 27, 210–226. [CrossRef]

86. Ikeda, M. The new product development system of the Japanese automobile industry. In New Product Development and Production Networks; Jurgens, U., Ed.; Springer: Berlin/Heidelberg, Germany, 2000.

87. Ramasesh, R.; Ord, J.; Hayya, J.; Pan, A. Sole versus dual sourcing in stochastic lead time. Inventory Models Manag. Sci. 1991, 37, 428–443.

88. Chopra, S.; Sodhi, M.S. Reducing the risk of supply chain disruptions. MIT Sloan Manag. Rev. 2014, 55, 73–80.

89. Dyer, J.; Singh, H. The relational view: Co-operative strategy and sources of interorganisational competitive and advantage. Acad. Manag. Rev. 1998, 23, 60–79. [CrossRef]

90. UN. Envision2030: 17 Goals to Transform the World for Persons with Disabilities. 2020. Available online: https://www.un.org/development/desa/disabilities/envision2030.html (accessed on 1 April 2020).

91. UNESCWA. Final List of Proposed Sustainable Development Goal Indicators. 2016. Available online: https://www.unescwa.org/sites/www.unescwa.org/files/events/files/official_list_of_proposed_sdg_indicators-rev1_download_19dec2016.pdf (accessed on 9 May 2019).

92. Fonseca, L.M.; Domingues, J.P.; Dima, A.M. Mapping the sustainable development goals relationships. Sustainability 2020, 12, 3359. [CrossRef]