

## IEEE GOL 2022 - Special Session

### “TOWARDS INDUSTRY 5.0 TOOLS IMPLEMENTATION IN DIGITAL SUPPLY CHAINS”

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#### **Abstract:**

In our day, supply chain management has become a very important part in the world of the industry. It allows a good follow-up of the production flow from the raw material until the finished product (Stank et al., 2019). The development and improvement of companies is related to the development of SCM (supply chain Management) as a whole. Industry 4.0 (I4.0) technologies have played a very important role in the improvement of companies to keep their competitiveness and competition in order to deliver good products to the right customer in the shortest time while meeting the requirements of customers (C.S. Tang et al., 2019). Several industry tools have been used in SCM in order to increase the level of management and competitiveness by betting on the convergence between the physical and virtual world cyber physical system CPS (Gu, J et al., 2019).

As many fields, SCs are taking a big step toward digitization, automation and agility (Monahan & Hu, 2015), and these could be achieved through the use of I4.0 technologies. The impact of I4.0 can be seen at all stages of the CS processes, as well as in the SCM framework; for example, increased supplier performance through the real-time information exchange and harmonization with suppliers, and smart logistics and vehicle routing platforms, more accurate procurement through continuous flow and higher transparency of products and materials, (Hofmann and Rüsck, 2017; Ghobakhloo, 2018). The growing relevance of stakeholder engagement and increased connection across SC partners require examining the impact I4.0 enabled technologies on the SC network perimeter (Tjahjono et al., 2017).

Digital Supply Chain is defined by Frank et al. (2019) as an I4.0 aspect that combines digital platforms with providers, distributors, consumer, and stakeholders. Expanding information sharing and synchronization of processes between SC members helps to lowering total expenses costs and improving the overall flexibility and reliability of SCs (Frank et al., 2019; Ghobakhloo and Fathi, 2019). The Increased confidence and deeper relationships between SC partners result from enhanced transparency and coordination within the SC ecosystem (Mussomeli et al., 2016). The adoption of I4.0 technologies lead to end-to-end visibility and real-time asset monitoring to improve overall value chain effectiveness and decrease risks, equipment and SC variables help to enhance the overall global value chain performance and minimize risks (Luthra and Mangla, 2018).

Although I4.0 is still in an initial stage, some concerns have been raised by researchers and practitioners concerning the role of humans amid this new technological environment. Some researchers have recently approached the role of humans in the I4.0 context (Longo et al., 2017; Romero et al., 2020).

However, the idea that the robot can completely replace humans is already outdated. Now, the future lies in the combination of humans and collaborative robots. We are talking about cobotics. Industry 5.0 (I5.0) is therefore the alliance of the "cobot" and the human to allow the industry to reach its highest potential: mass production thanks to the robot, which serves as a multifunctional tool for the human operator who for his part,

he adds his knowledge and creativity, freed from daunting tasks. It is this union that will transform the industry of today into the industry "5.0" of the future.

Thus, the "cobot" concept is one of the key elements of the upcoming industrial revolution. This concept of the "cobot" means working intelligently in the factory environment by the application of artificial intelligence, big data analytics, IoT, and other disruptive technologies, implying productivity improvement, wastes reduction, and the enhancement of sustainable goals (Frederico, 2021).

Hence, the still visionary idea of I5.0 has emerged in contrast to the paradigm that robots will dominate the industry environment. For instance, Ref. [40] argue that the highly automated environment allowed by Industry 4.0 puts humans at risk of no longer playing a valuable role. According to these authors, there is a relevant consensus that the era of robotics and automation in previous industrial revolutions brought about paradigm shifts in the manufacturing industry worldwide. Yet, they reinforce that although I5.0 has still to be materialized, the same will occur with this new revolution, mainly because the set of technologies established with the I4.0 phenomenon has been implicated in new paradigms.

Although I5.0 may still appear a premature idea, I5.0 is the era of a social smart factory, because every single cooperative building block of a CPPS (cyber– physical production systems) will be able to develop communication with humans through the enterprise social networks.

Thus, studies that work on this topic, mainly, from a literature review perspective is needed to support enterprises in creating effective and resilient I5.0-adapted supply chains and rapidly responding to quickly changing technologies and markets.

The purpose of this special session is to develop a better understanding of smart systems and autonomous processes of the I5.0 era, and mainly answer the following questions:

- How to collaborate and coordinate the operations of supply chain partners in the environment of I5.0?
- How humans will be collaborating with CPPS and complement the virtual and robotic elements of the automated production systems by the use of disruptive technologies, fostering faster and intuitive workflows?
- What are the challenges, opportunities, and strategies to align the supply chain operations with the I5.0 tools for increased agility and flexibility?
- What are the I5.0 technologies/tools capable of ensuring the success of businesses by increasing mobility and flexibility in digital supply chains context?
- How to utilize I5.0 technologies/tools to select the right supplier for the right material at the right time?

Therefore, this Special Session invites theoretical and empirical scientific contributions that explore ways in which an "I5.0" approach can improve all aspects of supply chains and logistical systems.

Original papers on, but not limited to, the following topics are welcome:

- Industry 5.0 and digital supply chains;
- Industry 5.0 and smart logistics;
- Cyberphysical systems and supply chains;
- Internet-of-things in supply chains and logistics;
- New supply chain models;

- Autonomous warehouse systems;
- Collaborative supply chain management;
- Data-driven SCOR models;
- End to end supply chain integration;
- Intelligent demand forecasting;
- Intelligent manufacturing systems;
- Intelligent transportation systems;
- Real-time supply chain synchronization and coordination
- Resilient supply chain management
- Smart products
- Smart factories
- Supplier selection intelligence
- Supply chain analytics
- Supply chain optimization
- Supply chain visibility and connectivity
- Sustainable supply chain management

## Keywords

- Industry 4.0
- Industry 5.0
- supply chain management and optimization
- Supply Chain 4.0
- Supply Chain 5.0
- supply chain analytics
- supply chain visibility and connectivity
- supply chain synchronization and coordination

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