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Smart Technologies for a Sustainable Service Supply Chain: A Prospective Perspective

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Abstract

This paper aims to present new smart technologies and their implications for the sustainability of the service supply chain. Our objective is to show the opportunities offered by smart technologies in the future of service supply chains. The article develops a prospective analysis of the opportunities offered by smart technologies regarding the sustainability of the service supply chain. A prospective analysis of the possible alternatives in terms of technological and commercial opportunities but also in terms of barriers to the development of technologies is proposed. This approach is guided by a literature review, interviews with experts, and a quantitative study. The prospective vision obtained traces strong development opportunities in artificial intelligence and Big-Data and exposes the strong presence of financial limits and technological risks inherent to sustainable and digital service logistics. This article proposes an original approach in terms of prospective methodology based on the PRODIN method integrating a literary study, semi-directive interviews, and a quantitative questionnaire.

1. Introduction

As technology rapidly transforms and globalization multiplies, supply chains are becoming increasingly connected. The coronavirus (COVID-19) epidemic and the prospects of global economic recovery have shown once again that supply chains (SC) must adapt continuously and sustainably to the economic and societal consequences of current changes, several environmental and ethical issues stand out to supply chains. These chains are more resilient and responsive in times of crisis which also triggers environmental questions (Ogbuke et al., 2022). A sustainable and durable supply chain is defined as the management of equipment, operations, logistics, and environmental effects and aspects of the entire supply chain. The various constraints related to environmental preservation are additional to meeting other business objectives (Wong et al., 2020). These ethical and environmental considerations are present in industrial and service supply chains (SSC). A service supply chain describes an institutional arrangement of a single or a group of service suppliers and providers entering into a relationship with a service customer or clients for a shared benefit (Bentalha et al., 2019). The sustainable supply chain service was proposed to simultaneously encompass and integrate investors' financial and economic orientations with stakeholders' concerns (Hmioui et al., 2020). Building a sustainable services supply chain is a relatively complicated and lengthy process. The adoption of durable solutions in the service supply chain presently looks to be an inside deal and a reaction to both environmental imperatives and pressures (Mei et al., 2021). They are so large and complex that many attempts are made to find an overall balance between economic, social, and environmental considerations in addition to the time, delivery, and quality imperatives already present in these chains. Gaining visibility and control can be problematic, as can keeping pace with regulations and commitments (Wang et al., 2021; Bamakan et al., 2021). The major purpose of this work is to develop a prospective analysis of the potential of intelligent technologies for the sustainability of the service supply chain. A prospective approach to detect possible visions in terms of technological and commercial opportunities and also in terms of brakes on technology development is proposed using a literature review and criteria selected by experts. Thus, after defining the concepts of sustainable service supply chains, and smart technologies, we will examine through a prospective process the current and future possibilities of the sustainability of service supply chains.

2. Theoretical and conceptual framework

2.1. Service supply chain: Specificities and challenges

The transition from traditional and standard logistics to the supply chain indicates a break in the strategy of the logistics organization of companies. It is essentially a shift from an intra-organizational dimension to a multi-actor approach (Boulay and de Faultrier, 2005). A logistics chain is a set of companies that transmit materials to each other. It is therefore several independent actors who contribute to the manufacture of a product and its delivery to the end user. It is a process and "a sequence of stages in the production of a product from the producer's suppliers to the customers of these customers" (Pimor, 2005). Currently, several questions are specific to the service supply chain (Bentalha, 2020; Liu et al., 2021). The peculiar nature of the structure of a SSC is mainly caused by its unique and particular attributes. Consequently, several experts (Choudhury et al., 2020; Rasolofo-Distler and Distler, 2018; Baltacioglu et al., 2007) have distinguished service supply chains by referring to them as Service Supply Chains. Service supply chain management (SSCM) is the practice of managing information, processes, and resources along the service supply chain to efficiently deliver services or products to clients (Lin et al., 2010). Ellram et al. (2004) implemented key functionalities of the service supply chain (Figure 1).

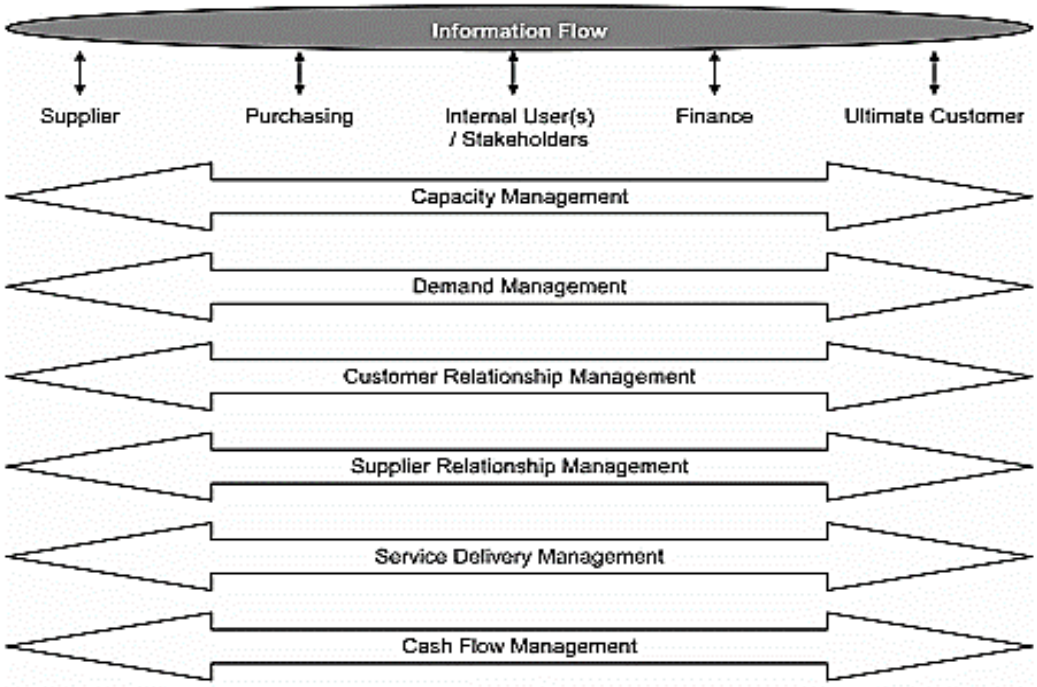

Figure 1: Service Supply Chain Model

Source: Ellram et al., 2004, p. 24

Supply Chain Management is currently of interest to competitive, open, and innovative companies. These entities interact in environments marked by open markets and rapidly evolving information and communication technologies. Thus, several new social and environmental considerations seem to have theoretical and empirical implications on service supply chains.

2.2. Sustainable service supply chain

The concept of "sustainable" is now abundant and seems to have multiple definitions and perceptions (Boks and Stevels, 2007). Sustainability appears to be part of the way companies deal with their operations and product. Indeed, 82% of S&P 500 corporations published distinct sustainability statements in 2016, which compared to merely 20% in 2011 (GreenBiz, 2018). The sustainable supply chain is the continuation and evolution of the conventional supply chain to incorporate operations that aim to reduce the lifecycle environmental effects of a product. According to Ahi & Searcy (2013), the sustainable supply chain would refer to a focal firm that is collaborating with its providers to increase environmental efficiency. It incorporates ecological, economic, and societal measurements of transactions throughout the supply chain (Chen et al., 2019). In this sustainable supply chain, several processes combine and complement each other to ensure delivery to the end consumer. Companies forming logistics groups and complementary organizations must

therefore constantly assess and evaluate not only the environmental and social effects of their chains but also those of connected and linked chains. A localistic and rather a near-term perspective on sustainability is consequently not adequate (Jabbour et al., 2019). The service sector is receiving considerable interest and growth whether in developing or emerging economies. This potential increase and future development prospects have fostered the emergence of a specialized field of study on services and the sustainability of service supply chains (Jamkhaneh and Ghadikolaei, 2020). However, as explained by Sengupta et al. (2006), the sustainability of service supply chains has different characteristics than manufacturing supply chains. A sustainable service supply chain is a collection of different links that aim to deliver services to customers while bringing together stakeholder concerns with environmental and ethical considerations (Hmioui et al., 2020). Implementing a green supply chain approach can bring advantages with about cost reduction, efficacy, and innovativeness (Luthra et al., 2012). The goal of sustainable supply chain management is to provide consistent delivery of top-quality goods and services across the chain to increase efficiency as well as environmental and social responsibility (Aliakbari Nouri et al., 2020). The main motivations for implementing a sustainable supply chain can be grouped into four categories: regulatory, seeking competitive advantage, stakeholder pressure, and internal company innovation (Bentalha et al., 2020). Ranking these motivations in order of importance is difficult and relies on various aspects like country, industry, and size of the companies studied.

Several research works have analyzed the sustainable supply chain, especially of services. Song et al (2016) analyzed the interactions between different parts of service chains. The authors deemed these interactions essential to create sustainable value. Liu et al, (2017) analyzed research on sustainable service supply chain management between 2006 and 2015. They proposed a framework for sustainable service supply chain management. Tseng et al. (2018) explained the nature of the hierarchical relationships of the logistics network and investigate the possibility of the practical implementation of the effectiveness of sustainable service supply chain management. Also, Tseng et al. (2020) proposed the integration of a fuzzy Delphi approach to identify the sustainability attributes of these chains. For example, Aliakbari Nouri et al. (2020) suggested seven major sustainability processes of the service supply chain. Lin et al. (2021) discussed the importance of strategy in a sustainable service chain. These studies on the SSC and especially on the relationships between service supply chains and the sustainability objective are largely exploratory. Indeed, there is a wide range of marginalized scientific methods (including qualitative studies or case studies). In addition, integrating the new economy and technologies is important in SSC. Indeed, today, Big-Data, Block-chain, or Internet of Things (IoT) seems to be strongly correlated with SSCs and the future trend is towards increased digitization of economies and companies. Finally, analysis of the influence of SSC durability practices on the success of service firms is generally marginalized. For this reason, it is essential to provide an extensive investigation of new digital technologies and how they contribute to the sustainability of service supply chains.

2.3. Smart technologies and SSC

Digitization has changed the way agents connect and interpret each other and their environment. Emerging technologies are all reshaping the way we approach and allocate information (Khan et al., 2021). These digital innovations and transformations are affecting all industries, and supply chains are no exception. Digital enterprise refers to the utilization of novel technologies (Feng and Ye, 2021). It is a kind of digital transformation that closes the distance separating customers' demands and the actual business proposal. The authors distinguish several areas of digitalization: Big-Data, Machine Learning, 3D printing, virtual reality, augmented reality, Blockchain, robotics, drones, nanotechnologies, or gamification (Manyika et al., 2015; Khan et al., 2021).

The digitalization of supply chains introduced rapid changes. A digital supply chain refers to a multitude of interconnected activities processed using IT tools (Büyüközkan and Göçer, 2018). Thus, digitalization and the introduction of smart technologies offer several benefits to businesses of which cost savings are probably the most important. The digital transformations of businesses allow them to benefit from additional functionalities, (Ström et al., 2014). New technologies have changed supply chain operations through a dramatic increase in collaboration and responsiveness (Crittenden et al., 2019). This has also improved relationships with customers and value networks. In addition to the opportunities for outside cooperation in the virtual supply chain, digitization offers opportunities for inside cooperation across organizations. It can foster collaborative work for the planning and execution of business processes by enabling information exchange and digitizing everything (Riemer and Schellhammer, 2019). This will facilitate a collaborative work environment (Merschbrock and Mundvold, 2015). These advances have disrupted logistics operations, changing and reorienting managerial and strategic considerations toward new scheduling problems and optimization methodologies. As a result, digital issues are increasingly present in academic debates and managerial questions.

3. Smart technologies for sustainable service supply chains: A prospective approach

This study attempts to meet the stated objectives by gathering the literature on the impact of smart technologies on the sustainability of service supply chains. To explore this topic, we will first conduct a literature review on the current state of practice of smart technologies in service supply chains. The aim is to identify new research perspectives regarding the development of digital technologies in supply chains. The literature was mainly selected from a survey of studies on potential future projects related to logistics operations. For this reason, we limited our search to articles published during the period 2017-2021. The literature review allowed us to explore the theme studied and propose a prospective analysis of the topic. The objective of the prospective study is to provide a futuristic and predictive way of thinking about intelligent technologies used in service supply chains. This exploration allowed us to identify the central themes and trends. A prioritization of tools, objectives, and constraints is conducted to refine the results obtained by a quantitative approach. A quantitative prospective analysis is carried out with the support of service supply chain experts. Prospective is an analytical and reflective process that seeks to prepare the future through a rational and logical analysis of current data. It aims to identify in an exploratory way and via several possibilities and scenarios issues of the future of a particular theme (Bentalha et al., 2019; Alla et al., 2022). It is a systematic scientific process of a set of conditional and causal predictions, which include key characteristics of a particular society or group of societies. Prospective is a process far from speculation and personal considerations. It is subject to scientific methods, which analyze the past and explain the present and study the causal relationship between the factors and variables influencing it (Peluso et al., 2005). This means that prospective is based on a solid foundation of scientific data and accurate quantitative and qualitative information about the current phenomenon in the present and its historical origins in the past, as an important element for predicting future social and economic changes. Prospective studies have become an unavoidable necessity and a reality to adapt to technological development and various transformations. Prospective studies seek to draw a global map of the future. They present the possible options and evaluate them to find the rational choice (Bentalha et al., 2021). They aim to reduce the severity of crises by predicting them before they occur and by preparing to face them. Many prospective techniques are used: The Delphi method, expert panels, scenario methods, the sigma model, the business prospective method, and the Dynamic Interrelational Prospective method (PRODIN). It is built on the active participation of the various actors (Kin et al., 2021). The PRODIN method is articulated in several analysis and work steps (Figure 2).

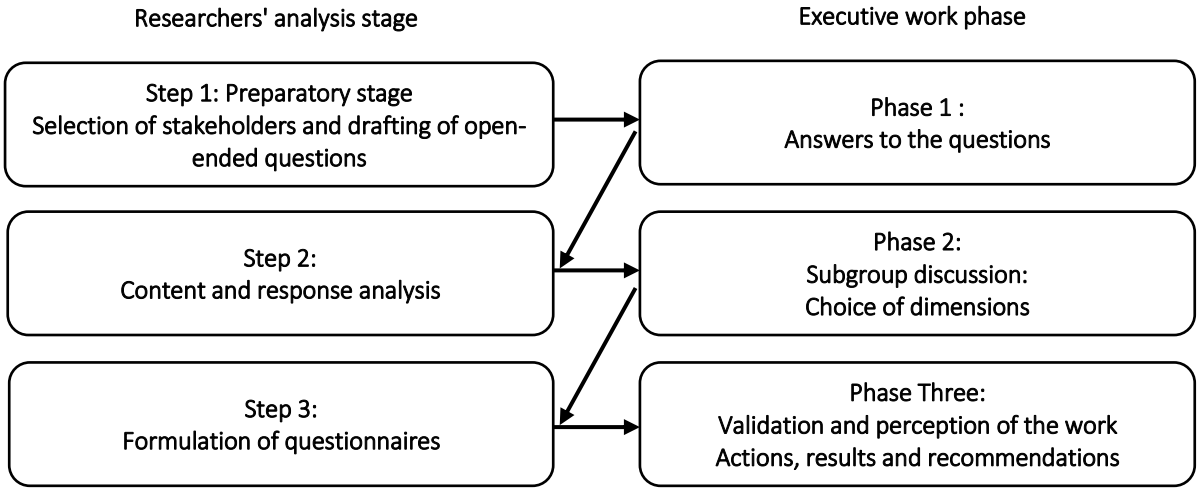

Figure 2: Diagram of the prospective process adopted

Source: Adapted from Bergadaà (1999)

Thus, given the advantages offered by this method, we have chosen to use this approach for our work. It involves combining the preparatory phase, the qualitative content analysis, and the results of the questionnaire to explore the impact of smart technologies on service supply chains.

4. Results and Discussion

To begin the empirical investigation, we will start by establishing a theoretical framework for the study. This preliminary step is based on the literature review conducted. By analyzing published works, we have gathered 27 articles related to the theme (Table 1).

Table 1: Main results of works analyzing smart technologies in service supply chains

Authors	Objectives	Findings
Hermann et al., (2016)	Most organizations face different challenges in adopting Industry 4.0	Theoretical bases for supply chain sustainability in Industry 4.0.
Erol et al., (2016)	Provide an inventive solution with numerical conversion.	Building visionary Industry 4.0 ideas
Trab et al. (2017)	Identify the advantages of the communicating object in smart logistics.	A model of intelligence in a warehouse management system called the IoT-controlled safety zone.
Trappey et al. (2017)	Technology analysis of IoT in smart logistics services.	IoT-based smart logistics patents are analyzed
Cardin et al. (2017)	Il analyzes a synthesis of smart business issues.	The biggest problem companies face may be system change. Uncertainties and risks are not taken into account.
Hofmann & Rüsch, (2017)	Industry 4.0 and logistics management	The importance of embarking on Industry 4.0.
Müller et al., (2017)	Build a virtual-physical net in which different machines, sensors, facilities and humans are networked and trade data between them.	Importance of privacy and data security issues
Shamim et al., (2017)	To build an effective Industry 4.0 concept	Industry 4.0 needs a major change in supply chain operations and business processes.
Ras et al., (2017)	Globalization and the complexity of supply chains.	Importance of staff training
Schuh et al., (2017)	Priority of digitization	Interdisciplinarity of Industry 4.0 the need for digitization to connect the different elements of a network.
Pfohl et al., (2017)	Highly efficient technologies are essential for Industry 4.0 adoption.	Improper internet connection is an Industry 4.0 barrier.
Saucedo-Martínez et al., (2017)	Requirement of a personalized and flexible environment.	Importance of big data in manufacturing processes.
Santos et al., (2017)	Data quality is paramount to Industry 4.0 acceptance.	Big data can enable sustained innovation in Industry 4.0
Duarte and Cruz-Machado, (2017)	Collaboration and transparency are the two major concepts in Industry 4.0 and supply chain sustainability.	Importance of coordination and collaboration with suppliers
Lee et al. (2018)	The authors suggested an IoT-based warehouse management system. This system aims to establish smart logistics for Industry 4.0.	Warehouse productivity, picking accuracy and efficiency can be improved through the use of IoT technology.
Perales et al., (2018)	In Industry 4.0, the main accent is on expertise and knowledge.	The ambiguity of return on investment is a barrier to Industry 4.0
Nicoletti, (2018)	Detection of the constraints of sustainable processes.	Cost constraints are viewed as a highly relevant issue in Industry 4.0,
Nguyen et al. (2018)	Classification of big data for supply chain management.	Domains, types, levels, models, & techniques of big data
Bentalha et al. (2019)	To present the factors of the current digitalization of the logistic chains of services	Importance of IoT and demand planning
Queiroz et al. (2019)	The disruptions brought by Blockchain in supply chain management.	Blockchain integration in SCMs is a start.
Yang et al. (2019)	Use of big data in the automatic identification system for marine studies.	The application of AIS data to navigation safety has evolved, with improved data accessibility
Ben-Daya	Review of the power of the Internet of	Important aspects of IoT in SCM

et al. (2019)	Things (IoT) on supply chain management.	
Winkelhaus and Grosse (2020)	Logistics 4.0 and its technologies	Solutions that support Logistics 4.0
Pournader et al. (2020)	Using blockchain in supply chain management.	Four overarching groups: technology, trust, commerce and traceability/transparency.
Musigmann et al. (2020)	Analyze of Blockchain in the field of logistics/SCM.	understand the state of research on blockchain in the supply chain
Aryal et al. (2020)	Study the growth of big data and IoT analytics	big data mainly addresses the intersection of the networks, systems and performance of customer service, assistance and the supply chain.
Kaffash et al. (2021)	Big data applications in intelligent transportation systems.	Big Data have a varied series of requests.

Source: Personal elaboration

An expert group was created consisting of 18 experts in the area of logistics who were possibly concerned with the subject of smart technologies in SCM. Afterwards, a qualitative evaluation of the content of the interviews was performed with Tropes and Iramuteq software. The first point of analysis is related to the different concepts most frequently mentioned by the experts (Table 2).

Table 2: The items most utilized by digital technology experts

Concepts	Number of items
Digital	152
Big-data	118
Internet and The Internet of Things (IoT)	95
Artificial Intelligence (AI)	88
Automatically	68
Forecasting	66
Robot	44
Software	43
Agility	34
Virtual	33
Traceability	23
Blockchain	3
3D	3

Source: Statistical study

Indeed, the main themes related to digital technologies and their uses in SSC are often discussed by SSC experts. The analyzed verbatim also mentions a wide proportion of verified doubt, of which here are some sample excerpts for illustration purposes:

+ All of these emerging issues face the high hurdle of **uncertainty** that has become the defining characteristic of the many elements included in the aforementioned operations
+ A critical stage in sustainable SCM is to bring about **behavioral change** throughout the SC

The analysis of the qualitative texts and verbatim led to the following conclusions about the future of digital technologies in supply chain services and the main possible scenarios. First, customers are relatively demanding in terms of service, timeliness, and information communication. The first technological statements evoke these requirements. Indeed, Big-data, IoT, AI, Automation, and forecasting are intimately linked with meeting customer and stakeholder requirements. Zero defects are one of the most important and achievable goals thanks to the development of technologies or the contributions of robotization and digitalization. In addition, customer demand for more and more personalized products is increasing. Since the adoption of new technologies must be done with an eye on their effects on the triple bottom line of the supply chain, it is

necessary to rethink and redefine the way companies create and deliver value to their customers. Indeed, the importance of Big-Data technology and AI is crucial for experts. Nevertheless, the Block-chain seems to be marginalized in the experts' discussions. This tool seems relatively oriented in the industrial sphere. Also, chain sustainability is a set of activities aimed at ensuring fair labor practices and environmental protection at every link in the supply chain. Through a combination of processes, policies, and technology, chain managers seek to optimize every facet of the product journey, from sourcing raw materials to delivering products to consumers. The role of employees is paramount in service supply chains. However, little discussion has focused on human resources and especially on the integration of technology with the way people work. In addition, a major element of a sustainable services supply chain is effective procurement. Suppliers influence the sustainability of other elements of the chain. Thus, real-time communication and tracking with suppliers, electronic data exchange, and shared databases are the key technologies outlined for this supplier relationship. With the introduction of robotics, service companies can improve their productivity and at the same time become more sustainable. This improvement can be achieved with greater precision and improved energy costs. The analysis carried out allowed us to identify the generic concept of "digital technologies in SSCM". Following the analysis of the interviews, we administered a questionnaire. The collected responses numbered 108 with different characteristics. The technologies adopted by the majority of respondents are Internet, website, and IoT integration with 84% consensus on the item. This is followed by demand planning with 69% and artificial intelligence with 68% agreement among respondents. Big Data, Intelligent Transportation & Handling and Automation & Robotics come next with 60%, 55% and 45%. The relatively marginalized element is Blockchain with only 12% (Table 3).

Table 3: Smart technologies adopted from the service company's SCM by items

Items	Elements	Percentage
Internet & Iot	Smart devices Mobile Sensors Tracking the speed of movement and traffic flow Monitor storage conditions Streamline movement	84 %
Digital demand planning	Predictive Analysis ERP platform	69 %
Artificial Intelligence AI	Demand Forecast New product launches Pricing optimization Customer service improvement Capture customer behavior in-store Automating product transfer in the warehouse	68 %
Big Data	Optimization of deliveries Supply management Anticipating needs and demands Inventory predictions Order fulfillment and real time tracking Tool maintenance	60 %
Intelligent transport and handling	Autonomous vehicles Drones Electric vehicles	55 %
Automatisation & robotisation	Robotic materials articulated and motorized arm AMR (Autonomous Mobile Robot)	54 %
Blockchain	Traceability	12 %

Source: Statistical study

On another level, we asked respondents about future investments. We found a predominance of investment effort in storage condition monitoring and demand forecasting technologies with 91% and 89% while improving customer service came in third with 88% (Table 4).

Table 4: Sustainable SSC smart technology investment effort

Categories	Items	%	Ranking by group	Global ranking
Internet & Iot	Smart devices	42	5	18
	Mobile Sensors	63	4	14
	Tracking the speed of movement and traffic flow	78	2	8
	Monitor storage conditions	91	1	1
	Streamline movement	66	3	12
Digital demand planning	Predictive Analysis	45	1	17
	ERP platform	26	2	22
Artificial Intelligence AI	Demand Forecast	89	1	2
	New product launches	42	6	18
	Pricing optimization	69	4	10
	Customer service improvement	88	2	3
	Capture customer behavior in-store	87	3	4
	Automating product transfer in the warehouse	46	5	16
Big Data	Optimization of deliveries	81	1	6
	Supply management	42	4	18
	Anticipating needs and demands	71	2	9
	Inventory predictions	41	5	21
	Order fulfillment and real time tracking	66	3	12
	Tool maintenance	16	6	25
Intelligent transport and handling	Autonomous vehicles	81	2	6
	Drones	87	1	4
	Electric vehicles	69	3	10
Automation and robotization	Robotic materials	55	1	15
	articulated and motorized arm	24	2	23
	AMR (Autonomous Mobile Robot)	22	3	24
Blockchain	Traceability	8	1	26

Source: Statistical study

The "Internet of Things" (IoT) is a platform for involving smart devices. It uses the internet at a global extension. This helps in the global and international integration of the supply chain within an organization and with the outside world with different stakeholders. It is an internal integration of the chain components and an external with the stakeholders. Capturing signals and monitoring the environment in real time ensures the optimal use of products and services. This includes checking temperature, humidity, and lighting conditions. The probability of risks and accidents can be reduced considerably. This improves supply chain performance in terms of cost, quality, delivery, and flexibility to enhance the financial, social, and environmental sustainability of businesses.

For demand planning, it is about giving decision makers scientific methods to balance demand by taking into account economic and environmental issues. These decision support systems seem to be able to contribute to the sustainability of smart chains. Artificial intelligence (AI) has generated a large body of literature on a variety of topics. Its main focus is on continuously improving the productivity of sustainable supply chains. Productivity and efficiency gains translate into increased output. At the same time, AI accelerates the extraction of natural resources and the processing of waste. Big Data tools are targeted at improving operational and strategic capabilities. The large amounts of data stored, analyzed, and leveraged can explain market trends, reduce waste and scrap, effectively leverage resource reuse, or optimally reduce costs and prices. Growing internationalization has created a necessity for the establishment of smart and transparent routes between business hubs. This is called Intelligent and Green Transportation (Bentalha, 2022). About automation and robotization, in the conditions of digitalization of the economy, the intelligent and informational potential can be a renewable source of green and sustainable development. Robots reduce waste, bring productive efficiency

and use new technologies. It is therefore useful to perceive the contributions of these technologies, especially in future logistic developments. For blockchain technology, improving the sustainability of the supply chain is a key element in achieving sustainable goals. It aims to redesign procurement and transaction mechanisms throughout supply chains. The main advantage of this technology is the global traceability of information. This coincides with the current requirements for reliability, transparency, and efficiency of sustainable supply chains. For the desired benefits of using digital technologies in SSC we discovered the features benefits below (Table 5):

Table 5: Desired benefits of using digital technologies in a sustainable service supply chain

Items	%
Improved stakeholder relations	86 %
Reduced transportation costs	66 %
Shorter delivery times	52 %
Improved quality of products and services	53 %
Reduced inventory	41 %
Have a good image in the company	29 %
Reduction of SCM risk	19 %
Reduction of the complexity of the supply chain	12 %

Source: Statistical study

There are numerous challenges and obstacles to the diffusion of smart technologies in service supply chains (Table 6).

Table 6: Barriers to the diffusion of smart technologies in sustainable service supply chain

Items	%
Financial constraints	87 %
Coordination and collaboration problems	84 %
Security issues	76 %
Reluctance to use smart technology	66 %
Lack of government support and policies	61 %
Legal issues	60 %
Profiling and complexity issues	57 %
Lack of understanding of smart technology implications	53 %
Weak research and development on smart technology adoption	40 %
Insufficient corporate vision and strategy for digital operations	39 %
Lack of digital literacy	35 %
The business case for digital investments is not well understood	34 %
Lack of skills in adopting/implementing new business models	30 %

Source: Statistical study

Indeed, the introduction and adaptation of new digital technologies seems to be a current and future imperative for sustainable supply chains. These digital transformations create new structural forms of these sustainable chains (Duarte and Cruz-Machado, 2017). The economic benefits of these technologies are present especially in terms of time, quality and productivity. However, the social and environmental impacts are not obvious and require further development and argumentation. Indeed, these technologies impose changes in social requirements and conditions at the social level. This can lead to training, retraining, or the replacement of man by machine. The environmental advantages are also present in terms of waste management and operational efficiency.

5. Conclusion

The article analyzed the impact of new smart technologies on the service supply chain. We conducted a prospective study to map out future trends. This research offers an overview and comprehension of limited previous scholarship on the connection between the digital transformation of businesses and smart technologies. The empirical data in the research study demonstrated that digital processing has many opportunities for organizations to support smart technologies. It spans some of the shortcomings and gaps in the scholarship in this area of science. Indeed, most of the work on digital technologies in logistics is partial and fragmented. Hence, the introduction of an expert opinion seems pertinent to the plurality of views and the comprehensiveness of the findings reached, as well as the different rounds of discussions and negotiations. Affected by new social and environmental considerations, logistics is widely discussed by practitioners and

researchers. Sustainability considerations have changed the perception of managerial and strategic variables of the service company. Moreover, the introduction of new intelligent technologies at the level of the different value chains has made it possible to adapt new mutations to the service chain. The prospective nature of our approach requires additional and more in-depth empirical research. This study has some limitations. The data collected is contextual and qualitative. An in-depth, longitudinal, or quantitative analysis can improve the understanding of the phenomenon studied. This can reduce subjective biases and allow for generalization in the results. As a result, it is feasible to perform complementary investigations in various environments to identify specific contextual or time-related differences.

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