

UTILIZING SOCIETY 5.0 TO PREVENT BLUEWASHING IN THE GLOBAL TEXTILE SUPPLY CHAIN

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Abstract: *The study focuses on preventing bluewashing in the worldwide textile supply chain. Recently, bluewashing, the practice of falsely portraying a product as socially sustainable, has come to light in the textile supply chain. This situation is created by the complexity of the supply chain and unregulated legislation imposed to fulfill the demands of the fast increasing textile business. Society 5.0, a human-centric concept, is proposed as a response to bluewashing. This strategy employs smart technology such as human-robot collaboration, blockchain, artificial intelligence, and tailored manufacturing. The paper presents conceptual frameworks for preventing bluewashing in the textile supply chain by utilizing Society 5.0's core principles and enabling technology. The frameworks study the prospects and drawbacks of establishing Society 5.0 through textile supply chain, emphasizing the benefits of ethical labour practice, production, and supply chain. Additionally, the study also addresses issues like worker skill development, investment return, cyber attack risk, and regulatory changes. The paper suggests a comprehensive approach to integrate Society 5.0 with the textile supply chain, including government legislation, incentives, and industrial collaboration.*

Keywords: Society 5.0, bluewashing, supply chain, blockchain, AI.

KORIŠĆENJE KONCEPTA DRUŠTVO 5.0 ZA SPREČAVANJE „BLUEWASHINGA“ U GLOBALNOM TEKSTILNOM LANCU SNABDEVANJA

Apstrakt: *Ova studije razmatra mogućnosti prevencije „bluewashinga“ u globalnom lancu snabdevanja tekstilom. Fenomen „bluewashinga“, koji podrazumeva lažno predstavljanje proizvoda kao društveno održivog, poslednjih godina postaje sve izraženiji u tekstilnoj industriji. Njegova pojava uslovljena je složenošću lanaca snabdevanja, kao i nedovoljno razvijenim regulatornim okvirom kojim se nastoji odgovoriti na zahteve ubrzanog rasta tekstilnog sektora. Kao potencijalno rešenje predlaže se koncept Društvo 5.0, zasnovan na principu usmerenosti na čoveka. Ovaj pristup podrazumeva primenu savremenih tehnologija, uključujući saradnju čoveka i robota, blokčejn, veštačku inteligenciju i personalizovanu proizvodnju. U radu se predstavljaju konceptualni okviri za sprečavanje „bluewashinga“ u tekstilnom lancu snabdevanja kroz primenu osnovnih načela i tehnologija Društva 5.0. Poseban akcenat stavljen je na mogućnosti unapređenja etičke radne prakse, proizvodnje i distribucije, ali i na izazove koji se odnose na razvoj veština zaposlenih, povraćaj investicija, rizike od sajber napada i regulatorne promene. Predloženi okvir naglašava potrebu za integrisanim pristupom, koji obuhvata državnu regulativu, podsticajne mere i industrijsku saradnju u cilju implementacije Društva 5.0 u globalni tekstilni lanac snabdevanja.*

Keywords: Društvo 5.0, „bluewashing“, lanac snabdevanja, blokčejn, veštačka inteligencija

1. INTRODUCTION

The Global textile consumption has reached approximately 62 million tons of garments per year, with a projected 102 million tons of garments by 2030, resulting in an epidemic increase in air, water, microplastic pollution from discharge into the food chain, and textile waste [1-3]. Furthermore, the surge in low-cost textile production resulted to fast fashion, when consumers frequently acquire trending clothing and hastily discard of them prematurely to the product's lifecycle [4,5]. This issue causes a paradox because, while fast fashion promotes the economy, it induces difficulties with textile disposal because the recycling business must deal with all of the waste generated by the textile industry [6]. In light of such adverse effects, public concern for environmental and social well-being is growing, which has been recognized by pioneer brands of the textile industry with an emphasis on sustainable approaches and disclosure to social issues, leading to significant development in the ethical fashion market [7,8]. Brands are now capitalizing on public feeling around environmental and social misery by stating that their products are manufactured maintaining social welfare practice. This frequently leads to brands using inflated, false, and illusory claims about the products' impact on society to elevate brand value. These practices, known as bluewashing, degrade the genuine meaning of sustainability and utilize it as a promotional slogan [9]. They have changed not only the purchasing habits but also the clothing industry.

There have been numerous attempts for preventing bluewashing. Society 5.0 represents a unique approach in this regard. Society 5.0 aims to create a people-centered, super-intelligent, and efficient society that ensures a comfortable and sustainable future for everybody. Society 5.0 aims to create value through customized offerings, innovative logistics, and smart production employing cutting-edge technologies [10]. By implementing Society 5.0, it can be achieved to improve social well-being and tackle bluewashing across the supply chain of textile industry.

The study aims to assess the prospects for adopting Society 5.0 in the supply chain of global textile industry for preventing bluewashing, as well as point out the benefits and challenges. To accomplish the review's purpose, the subsequent research inquiries were proposed:

RQ1: How can Society 5.0 be put into effect in the textile supply chain to tackle bluewashing?

RQ2: What are the opportunities for integrating Society 5.0's concept in the textile supply chain?

RQ3: What challenges must be overcome to adopt Society 5.0 in the textile industry?

RQ4: What policies and procedures can be recommended for adopting Society 5.0's concept in the textile supply chain?

RQ5: What is the future of incorporating Society 5.0 enabled technologies and its core value into the supply chain of textile industry to prevent bluewashing?

This study reviews the past research on bluewashing throughout the textile supply chain, including its causes and consequences. The study then investigates existing literature on Society 5.0, analyzes the fundamentals of the concept, and identifies the prospects for Society 5.0 based on smart technology in addition to the challenges posed by existing structure and policies. Based on the findings, the study presents a conceptual framework to establish Society 5.0 in the textile supply chain, and additionally provides an overview of potential policies and practices for effective implementation and the future of Society 5.0 in the textile supply chain.

2. HISTORICAL BACKGROUND

2.1. What is Bluewashing?

"Bluewashing" refers to any misleading assertions about a company's social activities or the consequences of a product or procedure [11]. In 2002 at the World Summit on Sustainable Development, the critics of the United Nations Global Compact (UNGC) at the raised the issue of bluewashing initially. They accused businesses of using UN partnership to conceal slack implementation of labour and human rights standards [11]. Related research supports the claim that UNGC members are ignoring their social commitments, revealing that while participants undertake cost-effective attempts to improve in only marginal areas, their performance is inferior than non-members in crucial and high-cost areas [12].

Practices such as Corporate Social Responsibility (CSR) and Environmental, Social, and Governance (ESG) were developed in accordance with growing openness and accountability requirements. CSR reflects organization's involvement in tackling social and environmental challenges while prioritizing legitimacy over financial benefit. However, there are risks that CSR claims might be inflated, deliberate, or impractical. ESG regulations evaluate an organization's environmental impact, social responsibility activities, and their governance policies. "Bluewashing" refers to the strategy of companies giving lip service to CSR aims with the intention to appear more socially com-

passionate than they actually are [13-18]. Bluewashing leads a business to emerge more socially concerned as opposed to it practically is. The practitioners of Bluewashing accomplish the least possible to please stakeholders, campaigning groups, and metaverse, assuming corporate social responsibility is the jurisdiction of the public affairs department [19].

Bluewashing is an emerging phenomena that got considerable attention, hence study on it is difficult to identify due to a lack of recognized vocabulary and ambiguous boundaries. For example, some scholars employ terminologies like "corporate hypocrisy" or "CSR-washing," which includes only the practice of inflated claims of maintaining CSR, excluding practices like greenwashing, bluewashing, and pinkwashing (a reference to misleading practice of female empowerment) [20,21]. Other scholars prefer the term "socialwashing" to separate it from environmental problems [22]. In addition, some scholars regard bluewashing to be a subsection of the broader term "greenwashing," instead of an independent approach [23]. Bluewashing tactics used in textile supply chains include partial disclosure and deceptive alliances with social organizations. These strategies are intended to emphasize favorable parts of a firm while concealing wider immoral behaviors. For example, they may claim to donate to charity while yet breaking labor rules. Brands can establish an ethical veneer by joining organizations such as the UN Global Compact, but this does not always reduce their harmful influence. Inconsistent statements may culminate to ambiguous and sordid assertions about social obligation, such as professing to care about 'fair accommodations for labourers' but not providing verification of social sustainability criteria (Figure 1) [24].

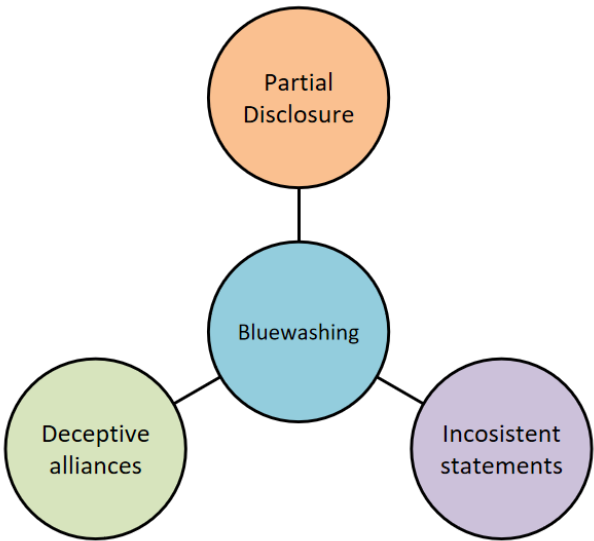


Figure 1: common methods of bluewashing

2.1.1 Causes of bluewashing

Many countries, particularly in Global South, lack sufficient legislations and enforcement tools to hold firms accountable for their statements about social sustainability. It enables businesses to get away with deceptive advertising tactics [25]. Consumers are becoming more aware of social and environmental footprints of fast fashion, driving up interest in sustainable and ethical fashion. However, majority of customers do not possess the expertise and instruments to scrutinize sustainability promises and detect bluewashing. This makes it easier for businesses to deceive consumers and use it as a chance for bluewashing [26,27]

The textile industry is chastised for being devoid of transparency in the supply chain, with multifaceted procurement from many nations where employment rules are ambiguous [28,29]. The lack of traceability in the supply chain has been linked to corruption in the textile sector via unfounded allegations, explicit breaches, tax evasion, unfair competition claims, bribery charges, and market rigging [28,30]. The absence of traceability in the supply chain is linked to corruption in the textile industry through unsubstantiated claims, explicit breaches, tax avoidance, unfair competition assertions, extortion charges, and market rigging [31]. Furthermore, a research found that the lack of transparency and accountability in fashion supply chains has resulted in large garment companies benefitting from Uyghur forced labor in China's Xinjiang province [32]. Fast fashion's global supply chains have resulted in excessive consumption, environmental degradation, excessive emissions, and abuse of labour [33]. The multilayered and enigmatic supply chains of fast fashion shops make it challenging to identify abuses, assign responsibility, and implement regulatory measures [34]. The multilayered and cryptic supply networks of fast fashion stores make it difficult to detect violations, assign blame, and apply regulatory measures [32]. This lack of openness enables businesses to deliver fabricated statements regarding their sustainable initiatives. Firms frequently practice inaccurate advertisements to portray what they sell as socially concerned, instead of offering authentic validation for supporting their statements. The aforementioned includes employing phrases like "eco-friendly," "sustainable," or "ethical" without clear meanings or qualifications [9].

Some businesses may concentrate on one component of sustainability, which includes the practice of employing recyclable components or reducing environmental effect, while ignoring other critical factors such as fair labour standards [35]. Establishing genuine practices to achieve sustainability may prove

expensive as well as challenging, particularly in small businesses. Such issues can make it difficult for certain businesses to implement sustainable practices, prompting them to turn to bluewashing instead.

2.1.2 Impact of bluewashing in global textile supply chain

Bluewashing is a strategy where the supply chain of textile industry deceptively claim to be sustainable while really engaging in damaging processes and activities that harm the people. This exploitation of consumer trust is dishonest and detrimental to society growth. Fast fashion companies frequently promote the use of sustainable textiles and manufacturing procedures, although they continue to employ hazardous processes. This erodes the credibility of organizations and brands, as people lose faith in true sustainable practices when they discover corporations promoting hollow sensationalism or falsifying about social sustainability [24].

Bluewashing prompted the textile industry to put funds in products that contradict alleged public commitments to human rights. Bluewashing also includes intentional or negligent misrepresentation, unlawful business operations, and misleading advertising about working conditions in several pioneer textile industries where child labor is reported to be exploited [36]. Auchan, a French retail giant, used deceptive marketing tactics regardless of a public statement that it promotes well-being of labourers; yet, a label of garments advertised by the company was discovered amid wreckages of the collapsed building of Rana Plaza, which resulted a toll of death over 1,100 workers of textile industry located in that building [37]. In general, inaccurate claims of any item or operation in the textile supply chain is socially concerned and sustainable impedes progress toward sustainability while also disrupting the environment, social, and economic pillars of sustainability. Bluewashing undermines the commitments of businesses which are legitimately devoted towards sustainability practices by creating consumer misunderstanding and distrust [24].

KnowTheChain benchmark in 2021 revealed that high-end fashion brands like Kering and LVMH, as well as budget vendors like Amazon and Walmart, performed mostly poorly in terms of dealing exploitation of human rights in global textile supply chains after evaluating campaigns of major fashion brands. It indicates that an expensive tag does not imply greater accountability and consideration for the welfare of labourers. Approximately 97% of the businesses have a supplier's standard that prohibits labour under

force, as well as frameworks for supplier surveillance. Nevertheless, these measures have proven ineffective for preventing forceful labour or offering solutions to workers [38]. Renowned brands like H&M, Calvin Klein, Gap, Nike, Adidas, Shien, and Tommy Hilfiger have all been accused for using enslaved labours from Uyghurs, either at the supply chain of or operations of cotton production. Xinjiang, homeland to the Uyghurs is a key supplier of cotton to China and worldwide clothing brands. In accordance to a coalition comprising over one hundred and eighty organizations of human rights, around 20% of the items derived from cotton globally traded includes traces of unlawful labour against consent [25].

2.2 What is Society 5.0?

The concept of "Society 5.0" was coined by the Japanese government in 2016, who envisioned it as an intelligent society built on scientific and technical innovation. The goal of Society 5.0 is to create a human-centered, super-smart, and lean society based on an independent, decentralized structure. It seeks to build a human-centric, hyperintelligent community where all residents have access to premium goods and services at their convenience. This can be accomplished by integrating virtual world with physical dimensions with the assistance of 5G, Big Data, and artificial intelligence (Figure 2) [39]. Society 5.0 integrates technologies throughout society. These systems acquire a wide range of real-time information. These informations are then interpreted through advanced information technology including artificial intelligence. In Society 5.0, the resulting data will influence not just the functionality of automations, but also individuals' behavior. Society 5.0 promotes a dynamic process that collects and assesses data, then turn that data into valuable knowledge for implementing it in the physical space; this cycle also occurs on a societal level. In Society 5.0, cyberspace goes beyond data sharing. It denotes a virtual setting for problem diagnosis and real-world solution modeling. Society 5.0 computer systems evaluate real-world data using a framework that is analogous to the physical world. Society 5.0 intends incorporating physical simulations within virtual place in order to deliver exact answers to complicated problems as well as to enable enhanced amenities and values in the real world. By merging internet and real space, Society 5.0 can accomplish a socio-centric strategy which combines holistic financial growth with human well-being [40].

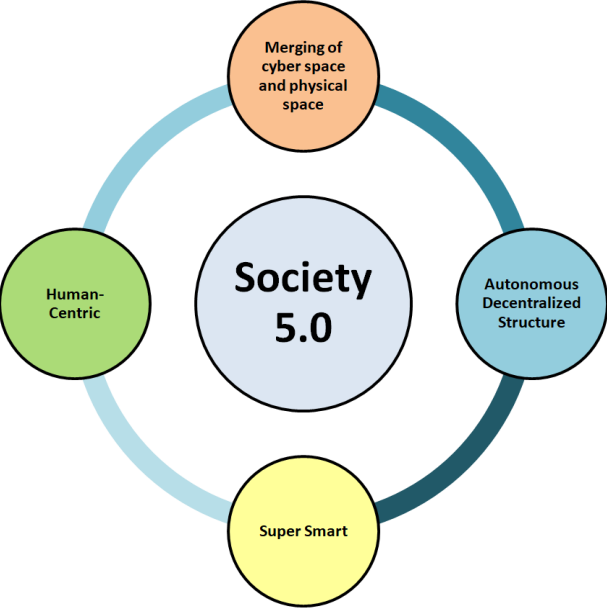


Figure 2: Visualizing the core of Society 5.0

2.2.1 How society 5.0 differs from Industry 5.0

Industry 5.0 aims to create a human-centric, sustainable, and resilient manufacturing system that fosters industry growth and development [41]. The European Union proposed the concept of Industry 5.0. On the contrary, the Japanese government presented Society 5.0, a blueprint for an innovative community built on scholarly and technical innovation[42]. The ultimate goal is to create a society that is human-centered, intelligent, and efficient. Though both concepts emphasize human-centricity, Industry 5.0 focuses on the progress of human-centric industry, whereas Society 5.0 aims for the overall growth of society and individuals. In an organizational dimension, Industry 5.0's key theme of resiliency focuses on the industrial system to mitigate unpredictability, whereas Society emphasizes the integration of cyber and physical space to ensure individual lifestyle and address society's problems (Table 1) [43,44]. Both approaches welcome novel innovations like ultramodern networks, big data, AI, and digital twins. New technologies will

accelerate digitalization and intellectualization, altering businesses and societies. Technological advancements will benefit and promote all areas of the Industry 5.0 or Society 5.0 system [10].

3. CONCEPTUAL FRAMEWORK TO UTILIZE SOCIETY 5.0 WITHIN TEXTILE SUPPLY CHAIN FOR PREVENT BLUEWASHING

3.1. Relevance of Society 5.0's core value in textile supply chain for preventing bluwashing

To prevent bluwashing in the textile supply chain, this study presents a conceptual framework for integrating Society 5.0's core value in the textile supply chain. In this framework the societal challenge in the supply chain is first addressed, which is bluwashing. Then the framework evaluates the fundamentals Society 5.0 to find possible solutions of bluwashing. Human-centricity is a core value of Society 5.0 that prioritizes on worker well-being in a surrounding. It changes the textile sector's focus of profit maximization to labourer's welfare via ensuring fair wages, safe workplace, and no forced labour in the supply chain. This core value also considers workers and consumers as shareholders in the supply chain which drives to genuine interest serving through ethical and responsible actions, eventually leading to bluwashing prevention.

Society 5.0's core value for merging cyberspace with physical space aims utilization of Society 5.0 enabled technologies to bridge the information gap of textile supply chain. This goal can be achieved by utilizing Internet of Things (IoT), blockchain for real time monitoring, data collections, and providing digital footprint in the textile supply chain. It leads to a transparent and accountable supply chain management, preventing bluwashing.

The core value emphasizing Data driven Society leverages big data and artificial intelligence. These technologies can detect anomalies through pattern recognition in the supply chain. After detecting anom-

Table 1: The difference between Industry 5.0 and Society 5.0

Attributes	Industry 5.0	Society 5.0
Proposed by	European Union	Government of Japan
Core value	Human-centric, sustainable, and resilient industrial process	Human-centric, Super smart, and lean society
Focus	Progress of human-centric industry	overall growth of society and individuals. In an organizational dimension

alies, data driven society can assess the risks and provide insights to prevent bluewashing.

The framework later assess the collected data and insights obtained from the core values of Society 5.0 into an actionable knowledge. It aids to develop a knowledge intensive society which enable consumer empowerment, supply chain transparency, and regulatory oversight. Finally, the framework solves the societal challenge of bluewashing through a holistic solution by utilizing Society 5.0's key principles (Figure 3).

3.2. Relevance of Society 5.0 enabled gadgets in textile supply chain for preventing bluewashing

The study proposes another framework utilizing Society 5.0 enabled technologies in the textile supply chain to prevent bluewashing. In Society 5.0, people-centered technologies are projected to benefit all parties involved and dramatically improve their daily lives. Consumers can buy custom-tailored garments made with Augmented Reality (AR) and Virtual Reality (VR), which also combine the efficiency of workers and machines in the textile supply chain [45-48]. Innovative logistics can tailor services to all stakeholders in the textile industry. The smart grid optimizes energy supply based on usage patterns, affordability, and other variables, resulting in increased power op-

timization and lower expenditure of operation in the textile supply chain [10].

The digital twin is an essential enabler for Society 5.0 and the Human-Cyber-Physical System, providing connectivity between cyberspace and physical space while also introducing new technologies like big data. Data from digital twins can improve product design and production operations throughout the textile supply chain [49]. Data mining can reveal hidden flaws and complex causality, resulting in improved maintenance outcomes[50]. Furthermore, digital twins can be utilized to increase operational efficiency in the textile supply chain by acquiring corresponding real-time states that allow for operation improvement. Human Digital Twin research is critical for a human-centered society because it allows prospective societal concerns in the textile supply chain to be spotted and assessed in real time, allowing for effective prevention tactics and avoiding catastrophic social transformations [51,52].

The textile industry's supply chain is complex, making it difficult to monitor the source of supplies and laborer working conditions [28,29]. This enables the textile industry to make deceptive claims about their products' sustainability without giving transparent proofs or certifications to back up assertions like "sustainable" or "ethical". This can be avoided by incorporating blockchain technology into the supply

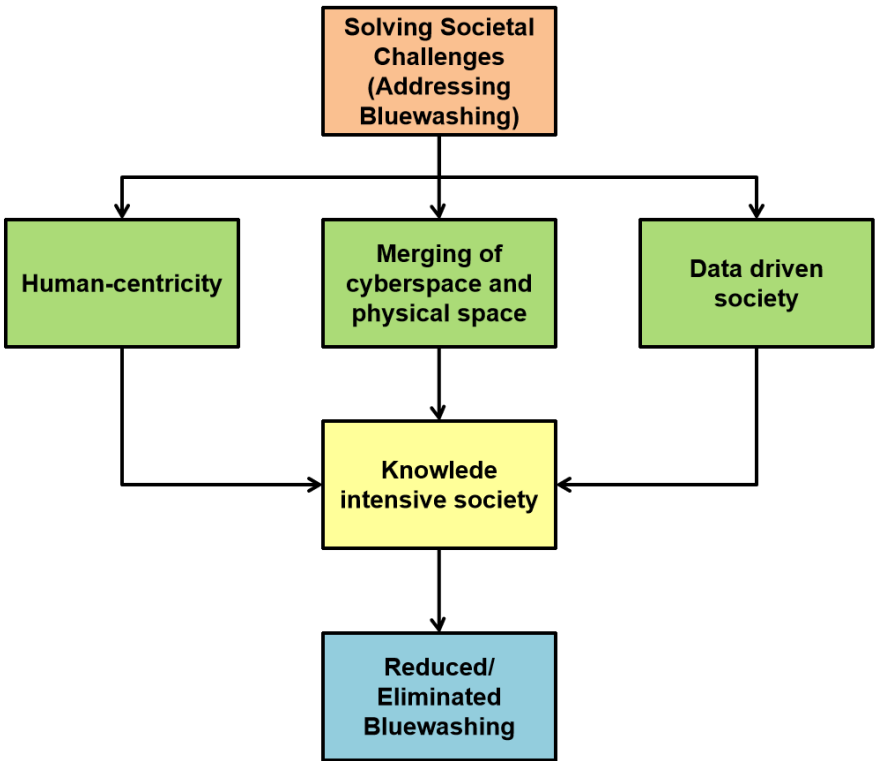


Figure 3: Society 5.0 Core Value framework for bluewashing prevention

chain, which allows for transparent traceability from raw material sourcing to production and general operations, providing social well-being [53,54]. AI-driven supply chains can foresee efficient inventory management to reduce inventory waste using real-time data insights and the Internet of Things (IoT) [55]. AI has the potential also enhance logistics by sourcing environmentally friendly, sustainable products and forecasting effective routes and modes of delivery [56]. Furthermore, AI enhances ethical supply chain management and fair labor standards through streamlining industrial operations and reducing contaminants, thus preventing bluewashing [57].

These Society 5.0 enabled technologies develop a digital platform for the users to engage and monitor supply chain. Thus, this framework prevents bluewashing in the textile supply chain effectively (Figure 4).

4. CHALLENGES AND FUTURE PERSPECTIVES

The textile supply chain has various challenges as it attempts to adapt to Society 5.0 [58]. The rapid growth of technology enabled by Society 5.0 has resulted in an unstructured and unprepared paradigm in which the textile sector must successfully manage transitions to achieve a competitive advantage and

avoid failures while taking into account technological infrastructure and investment [59]. Moreover, the paradigm shift of Society 5.0-supported technology requires both lawmakers and regulators to adopt appropriate rules and norms, which can be a time-consuming process due to governments' and politicians' poor adaptation. The textile supply chain has yet to fully embrace Industry 4.0, and it is unprepared to re-atto the adjustments driven forth by Society 5.0 [60]. Implementing Society 5.0 necessitates a major overhaul of the textile industry's management capabilities and strategy [61]. The successful incorporation of digital tools such as artificial intelligence, the Internet of Things, and big data into operations requires rigorous consideration of maintenance, cyber security threats, and ethical considerations. The textile industry may confront challenges as it navigates external variables such as globalization and the shift in market dynamics required to execute society 5.0. Furthermore, employee and manager resistance to change might hinder the implementation of society 5.0, while decision-making becomes more challenging as organized frameworks are required. Furthermore, organizations should tailor their transformation strategies to industry-specific settings, as a one-size-fits-all approach may be ineffective [58].

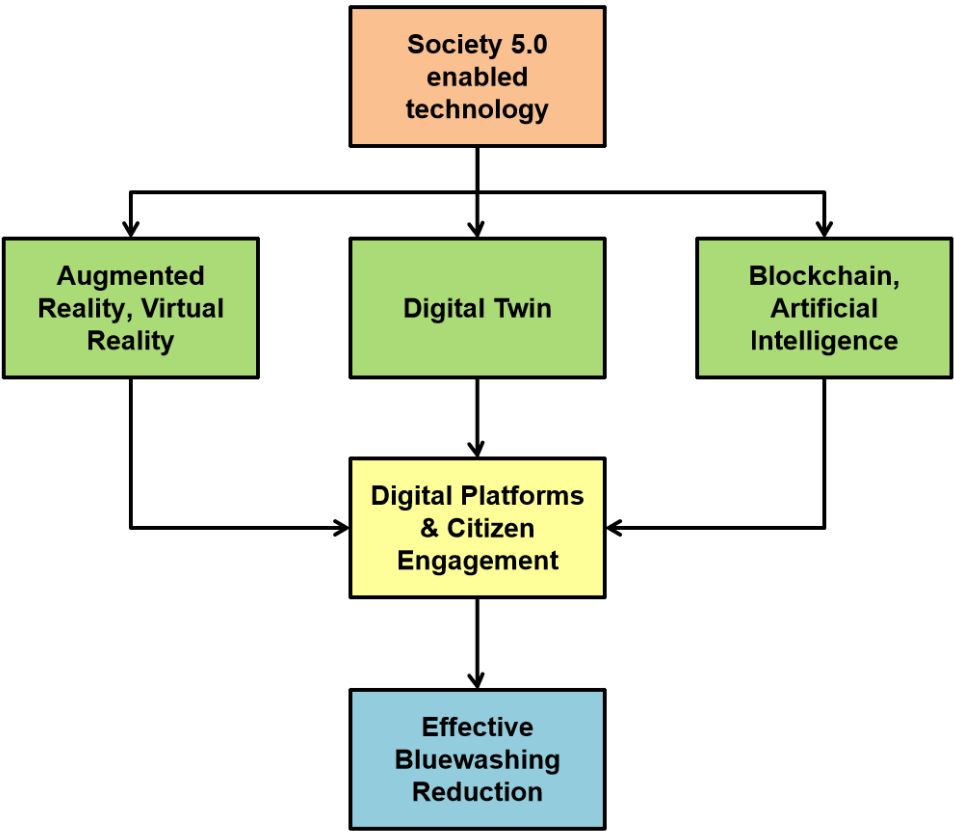


Figure 4: Society 5.0 enanled technology framework for bluewashing prevention

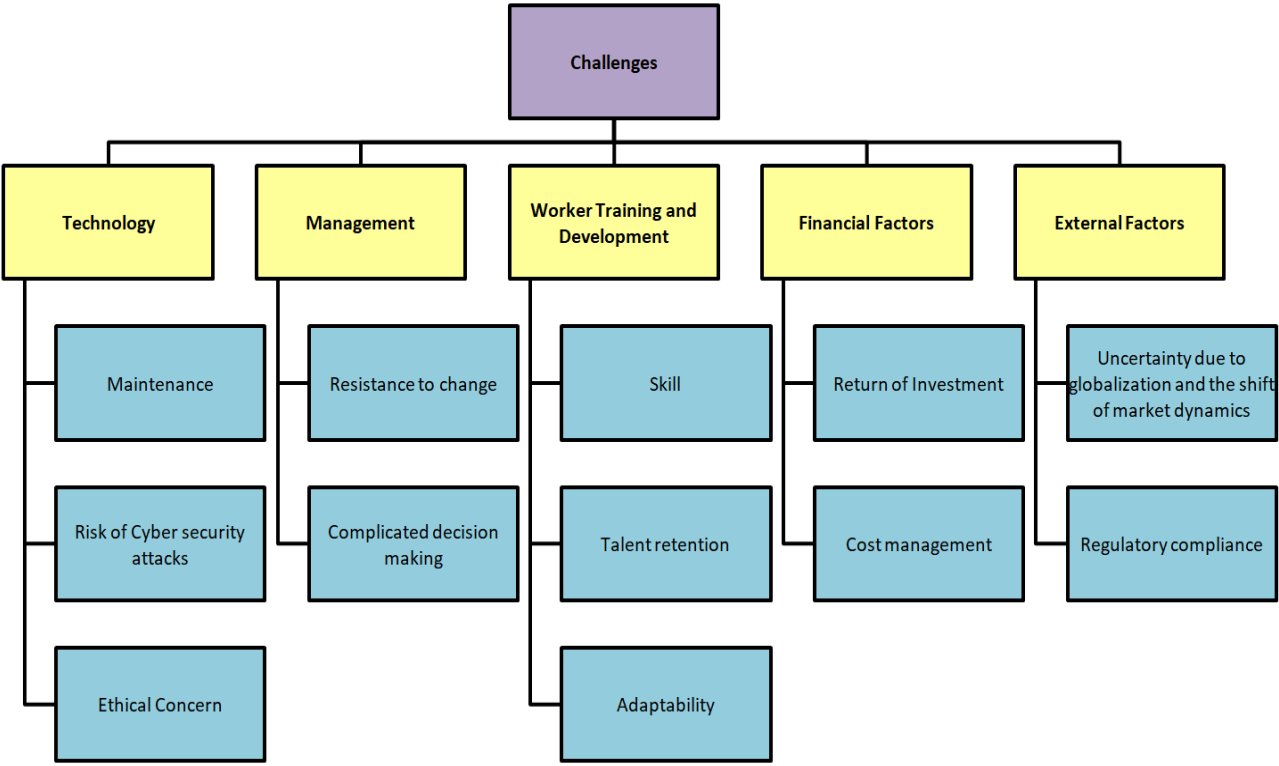


Figure 5: challenges observed during implementing Society 5.0 in the textile supply chain

Society 5.0 aims to change the textile industry from a labor-intensive paradigm to a highly efficient, sustainable, and flexible ecosystem. This concept incorporates hyper-personalization and mass customisation, with clients designing clothing on a digital platform, selecting sustainable materials, and having it manufactured on-demand by local micro-factories employing AI-powered robotics and 3D printing. This will boost consumer loyalty while lowering inventory risks. The circular economy will also include a waste-free textile industry equipped with AI-powered sorting and recycling facilities. Blockchain technology will track materials from fiber to finished product, saving water and energy while tackling environmental issues such as textile waste and water pollution [62]. Human-machine collaboration will improve factory productivity and efficiency, with collaborative robots tackling repetitive jobs [63]. AI algorithms will improve the overall process, making global textile supply chains more resilient and nimble. AI-powered predictive analytics will forecast demand changes and geopolitical dangers, allowing for appropriate adjustments. Blockchain technology will also allow for validated ethical sourcing and sustainability claims, avoiding bluewashing.

5. CONCLUSION

The study came to the conclusion that Society 5.0 has the potential to prevent bluewashing in the global textile supply chain by practicing its core value with a synchronizationsmart technologies, merging cyber space and physical space, and enabling a human-centered infrastructure. It shows the opportunity for Society 5.0 in the textile supply chain, such as ensuring real time monitoring, boosting accountability, transparency, and worker welfare through tailored product design, manufacturing, and logistics. Society 5.0 aims to create a socially responsible textile supply chain by merging cutting-edge technology with human innovations and moral principles. However, the research identifies significant obstacles in the scope of integrating Society 5.0 in the global textile supply chain. These include the supply chain's ability to adapt to a new paradigm, the necessity for workers to acquire new skills to manoeuvre Society 5.0 enabled technologies, and refined legislation and regulatory changes to address. Added to that, framework development is required to effectively execute Society 5.0 notions. Despite these limitations, Society 5.0 offers the capability to bring up new opportunities for the textile supply chain. A comprehensive approach to establishing suitable laws and regulations by the government and policymakers, coordination be-

tween the supply chain and the innovation hub, as well as extensive training and standards, can all help to ensure the effective implementation of Society 5.0 in the textile industry. Future research is required to discover how these technologies can be successfully developed and integrated as the supply chain evolves away from bulk sourcing and toward more customized, moral, and environmentally friendly alternatives. To summarize, Society 5.0 lays the way for a more ethical, inclusive, and progressive textile supply chain that can prevent bluewashing.

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